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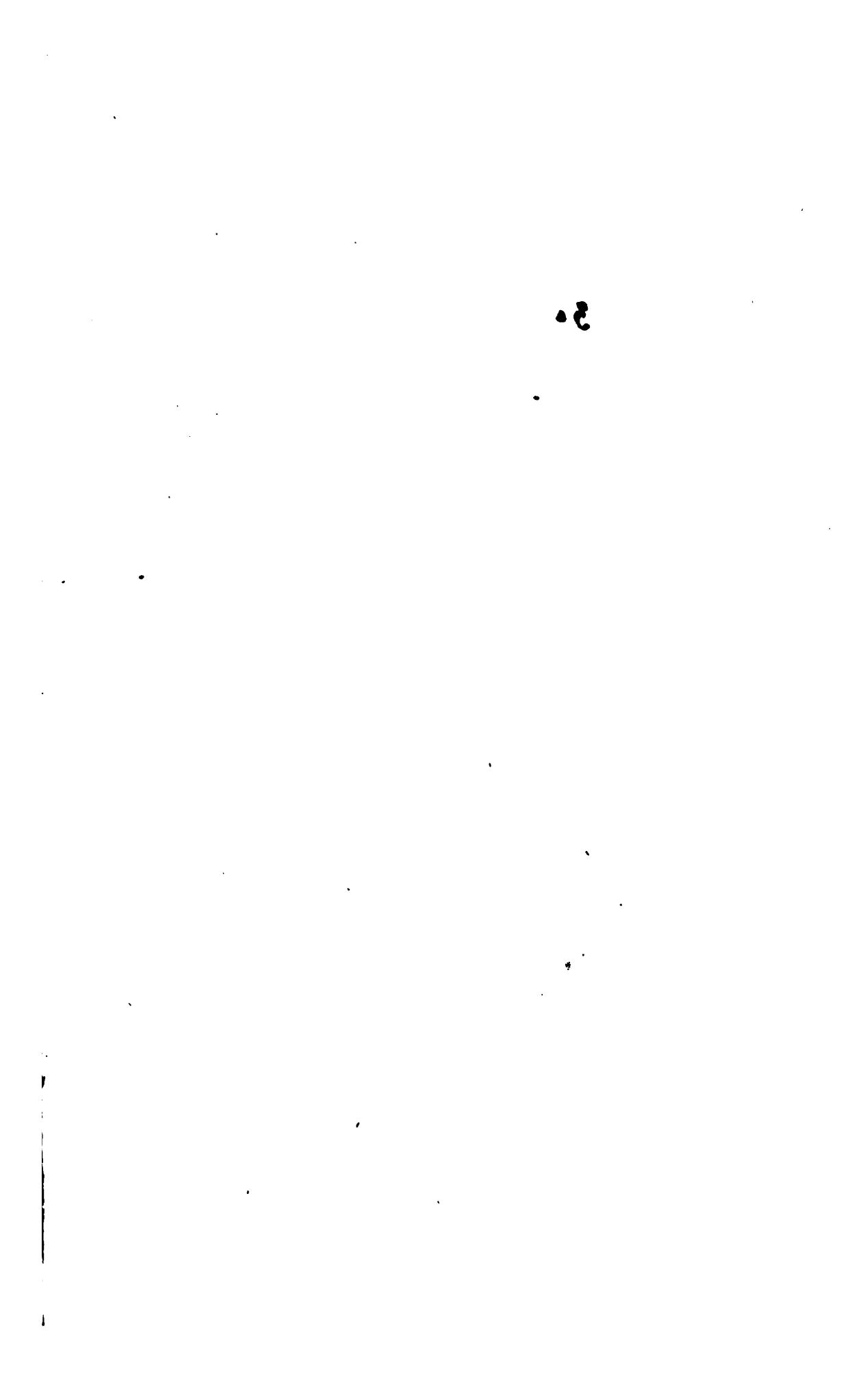
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LEAN'S
HISTORICAL STATEMENT
OF THE
STEAM ENGINES
IN
CORNWALL.

39.

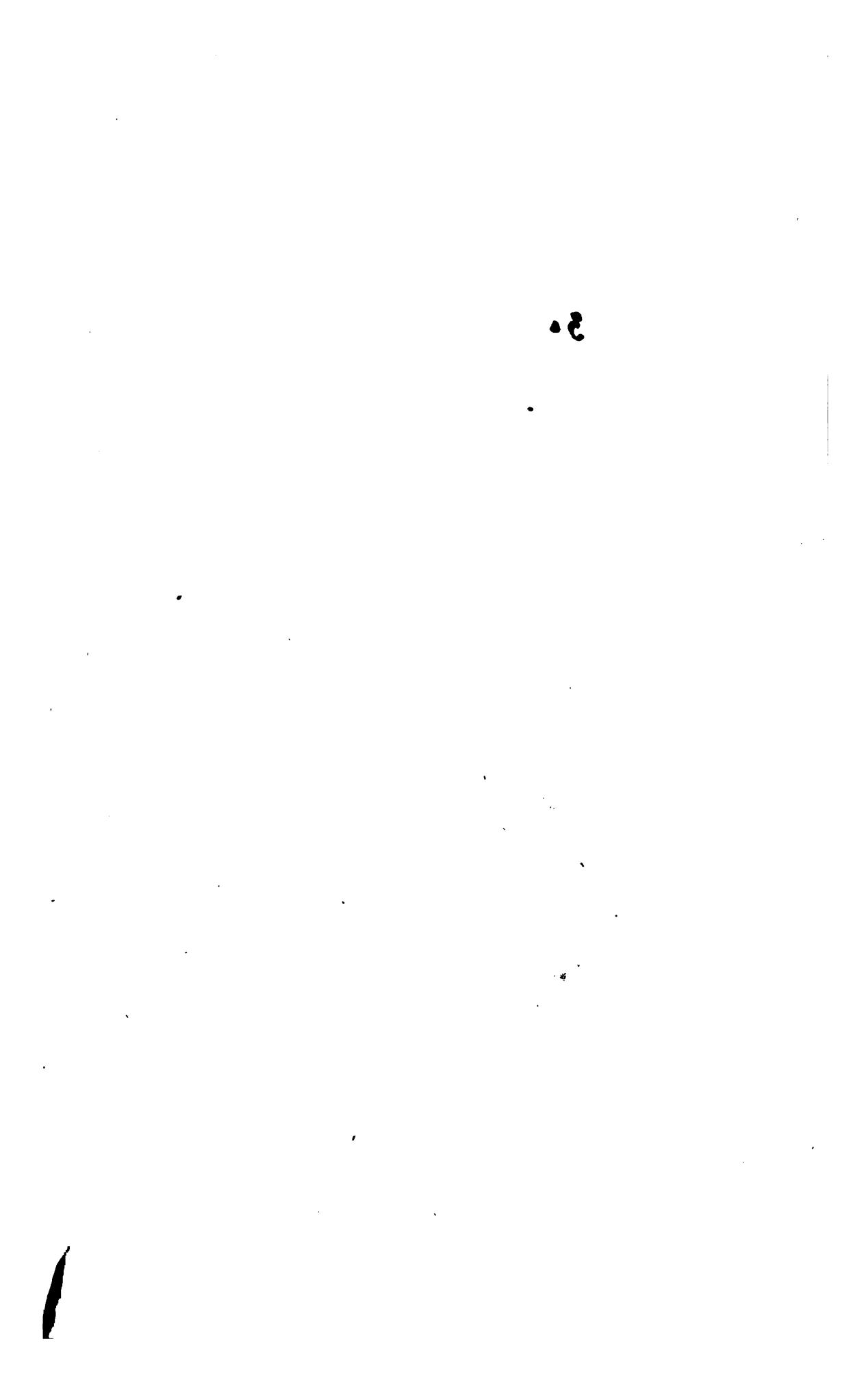
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HISTORICAL STATEMENT
OF THE
IMPROVEMENTS MADE IN THE DUTY PERFORMED
BY THE
STEAM ENGINES
IN
CORNWALL,
FROM THE COMMENCEMENT OF THE PUBLICATION OF THE
Monthly Reports.



COMPILED AT THE REQUEST OF THE BRITISH ASSOCIATION FOR THE IMPROVEMENT OF SCIENCE.

BY THOMAS LEAN AND BROTHER,
REGISTRARS AND REPORTERS OF THE DUTY OF STEAM ENGINES.

LONDON :
SIMPKIN, MARSHALL, AND Co., STATIONERS' HALL COURT.

1839.

1263.

L. Newton, Printer, Camborne, Cornwall.

TO THE
PRESIDENT AND COUNCIL
OF THE
BRITISH ASSOCIATION
FOR THE PROMOTION OF SCIENCE,
THIS WORK IS RESPECTFULLY PRESENTED
BY THEIR
OBEDIENT HUMBLE SERVANTS,
THOMAS LEAN AND BROTHER.

Marazion, June 1839.

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bring forward every instance, however obscure, from Hero of Alexandria to the Marquis of Worcester, which implies an early knowledge of the properties and application of steam. But as our business is with the occurrences of the last thirty years only, we shall confine these introductory remarks to the notice of certain particulars which appear to deserve attention, as being connected with the improvement of the steam engine.

To begin then with the generation of steam ; we find that, in order to ascertain the quantity of fuel required to evaporate a given quantity of water, many experiments have been tried, and with various results. From our own published reports we collect the following facts, which may be regarded as the result of experiments on a very large scale.

Attached to Loam's engine at the United Mines is an apparatus which correctly measures the quantity of water injected into the boiler. In the last six months of the year 1838, we find that the quantity of coal consumed by that engine was 700 tons, and the quantity of water injected 234210 cubic feet : which gives 15 cubic feet of water evaporated for every 100 lbs of coal consumed. This was effected under a pressure of about 50 lbs on the square inch ; yet it agrees pretty nearly with experiments tried on a smaller scale and in the open air, or under the pressure of the atmosphere alone. Now the diameter of the cylinder of this engine is 85 inches, and the stroke 10 feet : and it appears that the steam valve was shut when the piston had advanced between a fifth and a sixth part of the stroke ; that is, about 22 inches : consequently the quantity of steam expended each stroke was 72 cubic feet. Also the number of strokes made by this engine in the same six months was

1,631,000: whence it follows, that 500 cubic feet of steam were generated from 1 cubic foot of water under a pressure of 50 lbs on the square inch. And if we say (by inverse proportion) as 50 lbs : 500 cubic feet :: 14,75 : 1700, we get the number of cubic feet which the same steam would occupy under the pressure of the atmosphere alone; on the supposition that the space filled by the same steam is in inverse proportion to the elastic force: which agrees remarkably near with the result of the best conducted experiments in the open air: namely, that 1 cubic foot of water yields 1711 cubic feet of steam.

The foregoing facts seem to establish the truth of certain important positions, which have either been but partially admitted, as the result of experiments conducted on too small a scale, or have been denied, as conclusions drawn from analogy, unconfirmed by any experiment: viz.,

First; that it requires the same quantity of fuel to evaporate a given quantity of water under whatever pressure the evaporation may take place.

Secondly; that the expansive force of steam is, like that of air, inversely proportioned to the space into which it is expanded or compressed; provided no condensation take place.

Thirdly; that the water contained in a given quantity of steam in contact with the water of generation, is in direct proportion to its expansive force.

We also discover the remarkable fact; that the duty of the best pumping engines in Cornwall far exceeds what could be effected, were it even possible to apply the force of the steam immediately to the water, unencumbered by the friction and imperfection of machinery, or the loss arising from accidental condensation.

For example : 100 lbs of coal will convert 15 cubic feet of water into 7500 cubic feet of steam, having an elastic force of 50 lbs on the square inch: therefore, if the steam could be applied immediately to the water at the bottom of the pump, without loss by condensation, while a perfect vacuum was constantly maintained at the top, the weight lifted one foot high by the consumption of 100 lbs of coal, would be $7500 \times 144 \times 50 = 54,000,000$ lbs : while the duty of the best steam engines in Cornwall (although encumbered by much machinery) has been known to exceed double that number. This may, at first, appear startling, and almost incredible. It is, however, easily explained. It has been hinted above that the steam is sometimes admitted from the boiler into the cylinder during a fifth or a sixth part only of the stroke. It has also been shewn that the force of the steam (the temperature remaining unchanged) diminishes in the same ratio as the space increases. The action of the expanding steam on the piston, after the communication with the boiler has been cut off, will therefore be correctly represented by the hyperbolic space contained between the asymptote and curve. And if to the hyperbolic logarithm of the number of times the steam has been expanded we add unit, we shall have a number expressing the effect of the steam when worked expansively; the effect of the same steam not expanded being 1. For example : In Loam's engine as stated above, the steam at the end of the stroke was $5\frac{1}{2}$ times rarer than at the beginning : add 1 to the hyperbolic logarithm of $5\frac{1}{2}$ and we have 2,705, shewing that the efficiency of that engine was increased nearly as 1 to $2\frac{3}{4}$, by expansion.

We here subjoin a short table of hyperbolic logarithms for the convenience of those who may wish to compare the effects of different degrees of expansive working.

Hyperbolic Logarithms.

No.		No.		No.		No.	
1,	0,000000						
1,25	0,2231435	3,25	1,1786549	5,25	1,6582280	7,25	1,9810014
1,5	0,4054651	3,5	1,2527629	5,5	1,7047481	7,5	2,0149030
1,75	0,5596157	3,75	1,3217558	5,75	1,7491998	7,75	2,0476928
2,	0,6931472	4,	1,3862943	6,	1,7917594	8,	2,0794415
2,25	0,8109302	4,25	1,4469189	6,25	1,8325814	8,5	2,1400661
2,5	0,9162907	4,5	1,5040774	6,5	1,8718021	9,	2,1972245
2,75	1,0116008	4,75	1,5581446	6,75	1,9095425	9,5	2,2512917
3,	1,0986123	5,	1,6094379	7,	1,9459101	10,	2,3025851

From the above table we obtain the following scale of the efficiency of an engine of different degrees of expansive working : viz.,

Steam admitted throughout the stroke	1,000
cut off at $\frac{2}{3}$ stroke	1,405
$\frac{1}{2}$ stroke	1,693
$\frac{1}{3}$ stroke	2,099
$\frac{1}{4}$ stroke	2,386
$\frac{1}{5}$ stroke	2,609
$\frac{1}{6}$ stroke	2,792
$\frac{1}{7}$ stroke	2,946

On applying the instrument called an indicator to an engine which works expansively, it is found that the curve denoting the elastic force of the steam in the cylinder throughout the stroke, is not strictly an hyperbola; but that the lines representing the power of the steam are greater than what is due to that curve, even when allowance is made for the steam contained in the nozzles and in the small portion of the cylinder between

the piston and the cover, at the commencement of the stroke. A little consideration of the nature of steam will explain this.

When water passes from the liquid to the aeriform state, or becomes steam, it is found that much heat is absorbed or rendered latent; as much indeed as would have sufficed to raise the same water to a temperature 1000° higher, had it not changed its state and become steam; whereas the steam, after having absorbed this heat, continues at the same temperature as the water from which it has been generated: and if we would raise the temperature of the water or that of the steam, we must subject them to a pressure which is always the same at the same temperature.

The following table has been formed from experiments made to ascertain the elastic force of steam due to certain degrees of Fahrenheit's thermometer: the steam being always in connexion with the water from which it is generated.

Table shewing the elastic force of steam in pounds on the square inch, at different degrees of temperature of Fahrenheit.

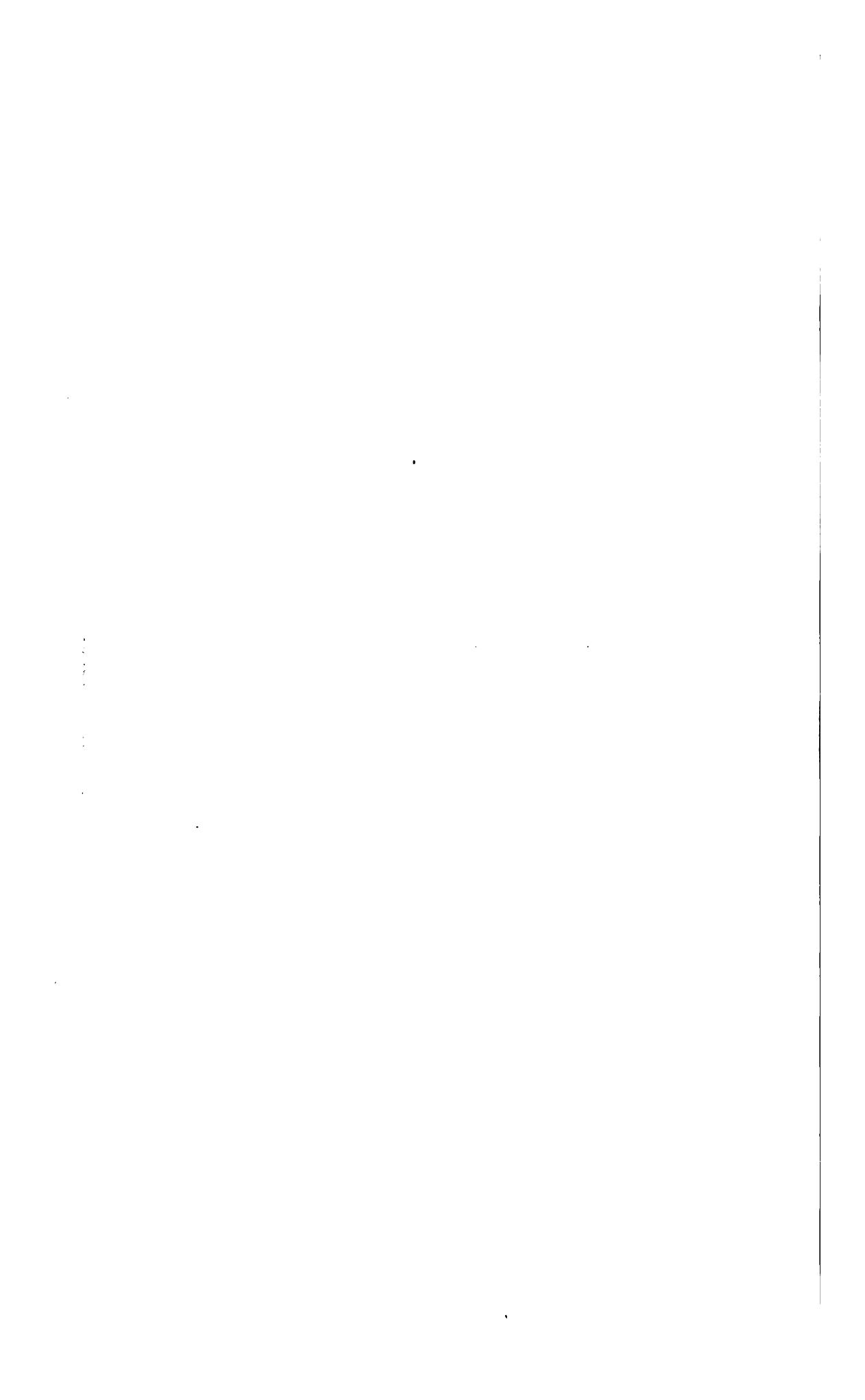
Temperature.	Elasticity.	Temperature.	Elasticity.	Temperature.	Elasticity.	Temperature.	Elasticity.
24°	,083	100°	,911	190°	9,310	260°	35,427
32	,098	110	1,203	200	11,564	270	42,287
40	,122	120	1,633	210	14,151	280	49,931
50	,176	130	2,139	212	14,700	290	58,874
55	,204	140	2,827	220	17,415	295	63,210
60	,253	150	3,690	225	19,164	300	68,453
70	,356	160	4,704	230	21,119	310	79,037
80	,495	170	5,905	240	25,333		
90	,666	180	7,428	250	30,331		

On reference to the foregoing table we see that steam, to have an expansive force of 50 lbs on the square inch, must be at the temperature of 280°: whereas the cylin-

der (owing to the unavoidable exposure of some of its parts, and the exhaustions which are continually going on) must stand at a lower degree. When the steam, therefore, is admitted from the boiler, a slight condensation takes place, which continues as long as the steam valve remains open ; and moisture is consequently deposited on the cylinder cover and piston. After the steam valve is closed, and expansion begins, this moisture is again converted into steam, and gives the appearance of a greater elastic force than is due to the expansion.

We have been thus particular on these two subjects—expansive working, and the temperature of the cylinder,—because it is chiefly by attention to them that the improvement of the Cornish engines has been effected.

ERRATUM :—Page 146, line 13, for “exhibit,” read *exhibits*.



HISTORICAL STATEMENT, &c.

HISTORICAL STATEMENT.

Great as are the advantages which this nation in general enjoys from the invention of the steam engine, and the successive improvements which it has received ; there is, perhaps, no place in particular, where those advantages have been greater, or more evident, than in Cornwall. The very existence of its deepest, most extensive, and most productive mines, is owing, not merely to the invention of the steam engine, but to the state of great perfection to which that machine has been brought in that county. And seeing that the improvements which the engine has, for many years, received, are due to native engineers ; whose skill and watchful care, maintain it in its present state, or add continually still further improvements ; it is deemed to be not without interest, to set forth the means by which this has been effected, and, as far as official documents make it known, the extent to which it has been carried.

“The history of mining in England,” says Mr. Taylor in his Records of Mining ;—and whose interesting paper on the Duty of Steam Engines we have freely used—“is indeed intimately connected with that

of the steam engine; and, if we had time to examine both, we should find that, as the mines were the scene of all the early inventors or improvers of this machine, so they also have not only benefitted by it, and in a great measure become dependent upon it, but have gone on contributing to the latest period, towards its perfection and economy." The term *Duty* as applied to steam engines, is explained by Davies Gilbert, Esq., the learned President of the Royal Society, in his paper read before the Society, Jan. 25, 1827: he says, 'that 'the criterion of the efficiency of ordinary machines, is 'force multiplied by the space through which it acts; 'the effect which they produce, measured in the same 'way, has been denominated *duty*; a term first intro- 'duced by Mr. Watt, in ascertaining the comparative 'merit of steam engines, when he assumed one pound, 'raised one foot high, for what has been called, in other 'countries, the dynamic unit, and by this criterion one 'bushel of coal has been found to perform a duty of 'thirty, forty, and even fifty millions, augmenting with 'improvements, chiefly in the fire-place, which produce 'a more rapid combustion, with consequently increased 'temperature and a more complete absorption of the 'generated heat, in addition to expansive working, and 'to the use of steam raised considerably above the at- 'mospheric pressure.'

"I believe," continues Mr. Taylor, "that considerable misapprehension exists, as to the means employed in Cornwall for measuring the duty of steam engines; or, in other words, of determining according to the preceding explanation, the number of millions of pounds of water lifted one foot high by a bushel of coal. It has been often objected that the account is taken inac-

cuarately, or by interested persons, by such as wish to make the engines appear to be better than they are ; further, that the water discharged is not actually measured or weighed ; and that calculating its quantity by the length or bore of the pumps is fallacious, as the valves are leaky, and the pumps sometimes draw air. Now as to the impartiality and care with which the account is taken, I can only say it is done at the expense, and under the direction, of those who, of all others, it most concerns to see that a correct estimate of the merit of the engines is produced ; I mean the proprietors of the mines, who employ these vast machines, and who look to these accounts to govern them in the choice of engines, and in their judgment of those who erect or superintend them ; if they neglect the means which may render this information accurate, they must be very inattentive to their own concerns, and they misapply a liberal sum which is allowed by them for the service. It has also been said that the duty is reported by engineers or persons concerned in the manufacture of engines. I need hardly contradict this after the observations previously made ; but shall only add that every one acquainted with the mines of Cornwall is well aware that this assumption is not true ; and that the monthly reports are in fact the test by which engineers must submit to be judged ; and that therefore, of course, many such may find in them matter for dissatisfaction, although they seldom venture to question their accuracy. Where doubt of this kind has been started, it has frequently been met by proper experiment and examination ; and the correctness of the statements have thus been very generally established. With regard to the second part of the objection, we have seen that this

mode of ascertaining the comparative merits of steam engines was introduced by Mr. Watt; and it is almost enough to remark that as he commenced, so it continues to be practised. He did not pretend to measure or weigh the water discharged, but he ascertained it by the capacity of the pumps, as we now do; he knew that there were cavils to be raised as to valves, and other imperfections, but he saw that it was, notwithstanding, a good practical method, and was therefore a fair standard of comparison for steam engines working pumps, which would, after all, be much alike in these respects; and that thus the objection, as between one another, would have but little weight.

“ Messrs. Boulton and Watt, in the early stage of the introduction of their engines, appealed to this proof of their efficacy; and, at later periods, when engaged in legal disputes respecting their patent rights, or in claiming their allowance for the use of them, resorted to the same means of comparison as are now employed. No one supposes that pumps are perfect; but this is not the question; for, if the different lifts of pumps in one mine are nearly in the same state as those in another, which will be the case in deep mines, where various columns will be working in different states of repair, the comparison of the duty of the respective engines, will be accurate enough for all practical purposes.

“ As regularity of action was speedily insured after Newcomen’s invention of the atmospheric engines, and they were thus found to be effective machines for draining mines, the consumption of fuel excited early attention, as it well might do from the great quantity then required to produce a given effect; and accord-

ingly almost every later improvement of importance to pumping engines, has had for its object the economy of the fuel employed. Had not, indeed, a great deal been accomplished in this respect, the use of this invaluable machine must have been limited to the richest mines, or to places where coal was cheap. The greatest difference observable, from what I have been able to collect, amounts to this, that in early times the duty of atmospheric engines was that of 5,000,000 pounds of water lifted one foot high by a bushel of coal ; and that of late, the duty of an engine erected by Captain Samuel Grose, at Wheal Towan, in Cornwall, has amounted to 87,000,000"—and that still later, viz. in September, 1834, the average duty for the month, of Austen's engine erected by Mr. William West at Fowey Consols, in the same county, amounted to about 98,000,000, or in other words, that a series of improvements has enabled us to extract, as it were, as much power from one bushel, as originally could be done from nearly twenty bushels.

"Nor has this great advance been made on a sudden or in a short time ; it has not been the work of any one individual, though considerable steps have been made by some ; no very new or surprising principle has been discovered ; but the application of known laws has produced different results in different hands ; and those who proposed improvements were not always those who adapted them to a successful application. More has been done by practical experience than by scientific research ; for though both were happily combined in some, to whom the world is greatly indebted for the present state of these machines, yet some of the most prominent advances have been made in the hands of

those, who dealt but little in theory or abstract investigation.

“ The facts which I have collected are as follows, and I place them according to their dates, as best calculated to exhibit the progress that has been made.

“ 1769. Mr. Smeaton computed the effects of 15 engines (atmospheric) working at Newcastle ; and according to the data he has furnished, the average duty was 5,590,000.

“ *Note.* The best was 7,440,000 ; the worst was 3,220,000.

“ 1772. Smeaton began his alterations in the steam engine, and succeeded in performing 9,450,000.

“ 1776. Mr. Watt stated, in a letter to Mr. Smeaton, that his engine at Soho raised between 20,000 and 30,000 cubic feet of water 20 feet high, with 120 lbs. of coal ; which would be equal to 21,600,000.

“ This was more, however, than Boulton and Watt would engage that their engines should perform ; as, in a letter written by Mr. Boulton to the Carron Company in this year, which contained proposals for erecting an engine, he stated the performance at equal to about 19,000,000.

“ Mr. Smeaton about this time, after many experiments, laid it down as a rule, that Watt’s engines would do double as much as his own ; which as we see above, was 9,45 millions, consequently 18,900,000.

“ 1778, 1779. Mr. Watt having stated that his engines should do 23,400,000, Mr. Smeaton made trial of two, (one on the Birmingham Canal, and one at Hull Water works,) and found the duty of one equal to 18,000,000, and the other 18,500,000.

“ 1778. Boulton and Watt erected an engine at

Hawkesbury Colliery, near Coventry, cylinder 58 inches diameter, stroke 8 feet, load 26,064 lbs, which was found to do nearly 19,000,000.

“ 1779 to 1788. Mr. Watt introduced the improvement of working steam expansively, and he calculated that engines which would previously do 19 to 20 millions would thus perform 26,600,000 ; but I do not find any record of this duty being performed in practice.

“ 1785. Boulton and Watt had engines in Cornwall working expansively, as at Wheal Gons and Wheal Chance in Camborne ; but in these the steam was not raised higher than before, and the piston made a considerable part of the stroke, therefore, before the steam valve was closed.

“ 1798. On account of a suit respecting their patent, which was carrying on by Boulton and Watt, an account of the duty of all the engines in Cornwall was taken by Davies Gilbert, Esq., and the late Captain Jenkin of Treworgie, and they found the average to be about 17,000.000.

“ An engine at Herland was found to be the best in the county, and was doing 27 millions, but being so much above all others, some error was apprehended. This engine was probably the best then ever erected, and attracted, therefore, the particular attention of Messrs. Boulton and Watt, who on a visit to Cornwall, came to see it, and had many experiments tried to ascertain its duty: it was under the care of Mr. Murdock, their agent in the county. Captain John Davey, the manager of the mine, used to state that it usually did 20 millions, and that Mr. Watt, at the time he inspected it, pronounced it perfect, and that further improvement could not be expected.

“ 1800. About this time Boulton and Watt’s patent having expired, other persons began to construct engines, and their agent, Mr. Murdoch, left Cornwall, where he had resided superintending most of the engines employed in the mines for sixteen years ; the duty of the best may be stated then at 20,000,000.”

When Boulton and Watt’s patent expired, as mentioned above, they removed from the county those experienced agents whom they had employed ; and as their object had been, not to instruct others who thereafter might be their successors ; but to reap the well earned fruits of their own superior skill, the county was left in a manner stripped of men possessing science and experience sufficient to maintain the engines in the improved state to which these eminent engineers had carried them. The natural, and almost inevitable consequence was, a very great and general deterioration of the machines, which continued for many years ; until the duty performed had sunk so low as would appear almost incredible to men acquainted with those only of the present day.

About the year 1801 the authors’ father, Captain Joel Lean, (who, besides being an experienced and intelligent miner, was a good practical engineer,) was appointed principal manager of Crenver and Oatfield, in the parish of Crowan ; one of the deepest and most extensive mines then at work in the county. He found the engines and pitwork in a very bad condition. The mines were about 170 fathoms deep from the surface, and 140 fathoms below the adit ; and the water was drained by three steam engines ; viz. a 63-inch cylinder double, on Bull’s mode of construction,—having the cylinder over the shaft, and the piston rod working

through its bottom ; and a 60-inch and 36-inch cylinder single engines, on Boulton and Watt's plan. The consumption of coals by these engines was enormous, and the average duty under ten millions : Bull's engine, 63-inch double, consumed fourteen chaldrons of coal in one day. The pit-work too, which consisted of leathern buckets with two or three pistons, such as were at that time in general use for plungers, was in a very bad state ; and it may be safely asserted that the engines were idle at least one third of the time, repairing the pit-work and changing the buckets.

After he had assumed the management, Captain Lean's attention was immediately directed to the pit-work: and here he first introduced (what is now so generally used and with so great advantage,) the plunger-pole, instead of the common box and piston, wherever he found it practicable. Equally bold and successful was the change which he made in the engines. The two smaller, (which were erected in the same house, and connected with the same rods,) he threw aside ; and put in their stead a 70-inch cylinder, —the first of the size ever erected in the county,—in which he adopted the expansive mode of working, at that time but little thought of, and very partially practised. These improvements saved the mine. At that time they were burdened with a debt of many thousand pounds, which was continually augmenting ; but as they now consumed less than half the previous quantity of coal, and, at the same time, kept the mine effectually drained, so that the miners could work without hinderance, they not only discharged the debt, but obtained considerable profit.

We have been thus particular respecting what our

much-honoured parent did at Crever and Oatfield, because of the important consequences which resulted from the improvements introduced by him into the engines and pit-work of those mines. For, being sensible that the defects which he had removed with so much advantage, were not confined to the engines under his care; and convinced that it would be attended with much good, if the public generally, but more especially all who were adventurers in mines, had the means of comparing the different engines with each other; he endeavoured to bring some others of the principal managers into his own views, and to awaken them to the necessity of registering and publishing the duty performed. It was, however, not till after many years that his wishes were accomplished. The first who appears to have been sufficiently alive to the subject, was the late Captain John Davey of Gwinear, who was the principal manager and engineer at Wheal Alfred; and accordingly the first report appeared in 1811, containing three engines at work on that mine, the average duty of which was about 20 millions: these engines were at that time reckoned the best in the county. Other mines quickly followed. In August of that year eight engines were reported, with an average duty of 15,7 millions; and, in December, the number had increased to twelve, average duty 17 millions.

From these small beginnings arose the practice, at present so extensively adopted, of publishing Monthly Reports: a practice which has, perhaps, been attended with more benefit to the county than any other single event, excepting only the invention of the steam engine itself. While Captain Davey had this matter on his mind, as mentioned above, he happened to be con-

versing on the subject with the late Captain William Davey of Wheal Unity; when one of them remarked, "That such a thing is most desirable cannot be denied, but where shall we find a man possessing the necessary qualifications,—leisure to attend to it; a thorough acquaintance with the business; and, above all, known integrity in which the public will be willing to confide?"

—The other, looking up, saw Captain Lean coming towards them, and replied, "Here is the very man we want, possessing all the qualifications you require."—

He was accordingly requested to take upon him the office of Registrar and Reporter, and by him and his sons it has been filled to the present day:—how ably it is not for us to say, with what effect, the following pages will shew.

In the three following years, viz. 1812, 1813, and 1814, the number of engines reported was 21, 29, and 32; and the average duty 19,3 millions, 19,5 millions, and 20,6 millions respectively.

It would appear from these numbers that the duty performed had been nearly stationary for these three years. This however, was not the case. The engines first placed on the reports, had much improved; and the general average was kept low by the accession of new engines; whose performance was almost invariably inferior, until attention had been called to the fact by their insertion on the Reports. In corroboration of this, we may adduce the instance of Stray Park engine,—a single engine on Boulton and Watt's construction, of 60-inch cylinder. When this engine was first put on the Report, in 1811, its duty was below 16 millions: during eight months ending with April, 1813, it had consumed 17633 bushels of coal, performed the average

duty of 21,5 millions, and worked at the rate of 5 strokes per minute: during eight months ending with April, 1814, it had consumed only 12671 bushels of coal, performed the average duty of 30,5 millions, and worked at the rate of 5,7 strokes per minute. Thus pumping from a deeper mine, a seventh part more water, with the consumption of 7440 bushels of coal per annum less; or a saving by one engine alone of about £300 on the cost of the preceding year. This engine maintained its standing to the end of the year; so that its average duty for the twelve months was 32 millions.

In this place we think it may not be amiss to insert a Table exhibiting a transcript of the Monthly Reports for 1814; and shewing the whole consumption of coal, the average duty, and strokes per minute, of each engine; together with the quantity of water drawn, and the depth of the mines, arranged in alphabetical order. The same will be repeated at the end of each period of seven years.

TABLE I.—Shewing the work performed by the pumping engines reported in 1814.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in Bushels.	Number of strokes.	Length of the stroke, in pumps.	Load in pounds.	Feet. Ins.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL ALFRED, <i>East.</i>	January	9,3	3222	—	7 6	29763	23,490,270	3,4		
	February	..	2592	309140	..	..	26,623,012	8,5		
	March	..	3888	471600	..	..	27,076,576	8,8		
	April	9,5	3006	376760	..	30010	25,963,741	8,9		
	May	11,0	3528	423440	..	30828	27,750,442	9,3		
	June	..	2592	344740	..	..	30,751,286	9,6		
	July	..	4158	484500	..	..	26,941,136	9,0		
	August	..	2826	321860	..	..	26,383,068	9,0		
	September	10,6	4194	466250	..	28486	24,584,848	9,0		
	October	..	3168	312000	..	..	21,778,431	7,7		
	November	1,08	2484	263830	7 9	29597	24,362,507	7,1		
	December	..	3885	—	..	..	24,000,000	..		
		<i>Total</i>	<i>39543</i>			<i>Average</i>	<i>25,804,693</i>	<i>8,66</i>		
WHEAL ALFRED, <i>Middle.</i>	January	7,4	3114	261920	6 6	32589	17,141,966	6,2		
	February	..	2970	269980	..	..	19,261,573	7,4		
	March	..	4158	406600	..	..	20,720,513	7,6		
	April	..	3276	310730	..	..	20,100,082	8,0		
	May	..	3384	329480	..	..	20,630,812	7,1		
	June	..	2502	286160	..	..	24,234,789	7,9		
	July	..	3186	353360	..	..	23,501,101	6,6		
	August	..	2070	228330	..	..	23,372,774	6,3		
	September	6,7	2844	339050	..	..	23,263,298	6,5		
	October	..	2466	254080	..	30008	23,498,828	6,3		
	November	8,2	2214	230890	..	35092	24,365,726	6,1		
	December	..	3564	324650	..	35945	21,282,838	6,1		
		<i>Total</i>	<i>35748</i>			<i>Average</i>	<i>21,780,441</i>	<i>6,9</i>		

TABLE I.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by one pound of coal.	Number of strokes per minute.	REMARKS.	
WHEAL ALFRED, West.										
WHEAL ALFRED, West.	January	9,9	3582	314140	6	40754	23,233,798	7,8	Diameter of the cylinder 64	
	February	..	3636	332160	6	..	24,199,536	8,9	inches ; length of the stroke, 8 ft. 4 in. ; working single.	
	March	..	5310	545340	..	..	27,206,482	10,2	John Davey, Engineer.
	April	..	3806	393430	..	..	26,681,349	10,1	Delivering to the water
	May	..	4428	423120	..	..	25,312,762	9,2	of a 14½ inch pump, 6 feet 6
	June	..	3204	342720	..	..	28,335,477	9,1	inches stroke = 45 gall. per
	July	..	4518	446130	..	..	26,157,610	8,3	stroke ; average 390,6 gall.
	August	..	3168	284000	..	..	23,747,438	7,9	per minute.
	September	9,5	4626	491240	..	..	27,504,767	9,4	East engine 228,79
	October	..	3330	315000	..	..	24,601,135	7,8	West engine 390,6
	November	9,0	2844	286240	..	..	24,374,630	7,6	Total 619,39 gall.
	December	..	4500	423220	..	..	22,856,560	7,9	per minute, delivered to the
			<i>Total</i>	<i>47052</i>			<i>Average</i>	<i>25,342,545</i>	8,68	
WHEAL ANN.										
WHEAL ANN.	January	8,0	2412	237960	6	9	30793	20,505,995	5,9	
	February	..	2322	247960	..	..	22,195,943	6,9	Diameter of the cylinder 60
	March	..	3402	360500	..	..	22,025,548	6,8	inches ; length of stroke 8 ft.
	April	8,5	2358	233850	..	..	21,111,369	6,0	9 inches ; working single.
	May	..	2826	313460	..	..	23,611,890	6,8	John Davey, Engineer.
	June	..	2178	221180	..	..	21,617,831	6,1	Drawing from 70 fathoms be-
	July	..	2844	304720	..	..	22,808,356	5,9	low the adit ; and discharg-
	August	..	1620	179530	..	..	23,590,990	5,0	ing therein the water of a 14½
	September	..	2160	—	..	..	22,130,026	4,3	inch pump, 6 feet 9 inches
	October	..	1728	224550	..	..	19,045,391	3,8	stroke, = 45,37 gall. aver-
	November	8,7	1856	142500	31456	18,270,978	3,53	age 232,16 gall. per minute.
	December	..	2628	214010	17,290,835	4,0	
			<i>Total</i>	<i>28184</i>			<i>Average</i>	<i>21,183,770</i>	<i>5,42</i>	

TABLE I.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal in Bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
W.H. ABRAHAM, <i>Old.</i>	January	10.2	2826	251990	7 6	358868	23,852,112	6.5	
	February	..	3006	282610	..	35887	25,304,453	6.7	
	March	10.3	3348	325670	..	36181	26,395,757	7.3	
	April	..	2132	293950	..	..	25,467,823	6.8	
	May	..	3168	329930	..	33432	26,144,775	6.9	
	June	..	3100	257000	..	..	28,189,055	6.8	
	July	7.9	3150	321050	7 0	31980	22,891,684	6.5	
	August	—	3100	—	—	—	—	—	
	September	6.6	2034	366430	7 6	23597	31,882,822	7.6	
	October	5.2	2124	363250	7 0	18004	21,563,617	8.4	
	November	5.0	2034	377620	7 3	..	24,238,215	8.7	
	Dec. 19.	..	1026	183500	..	..	23,345,098	6.7	
	.. 31.	6.3	738	125120	..	22445	27,588,493	7.1	
				<i>Total</i>	<i>32786</i>	<i>Average</i>	<i>25,570,747</i>	<i>7.17</i>	
W.H. ABRAHAM, <i>Woolf's.</i>	October	15.5	1602	316200	7 0	24726	34,054,585	7.3	
	November	..	1728	316900	..	..	31,741,716	7.3	
	Dec. 19.	15.1	828	142440	..	25346	30,521,726	6.1	
	.. 31.	..	684	131840	..	..	34,197,831	7.6	
				<i>Total</i>	<i>4842</i>	<i>Average</i>	<i>32,628,964</i>	<i>6.82</i>	

TABLE I.—Continued.

ENGINES.	Months.	Load per square inch on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL BREAGE.	January	16.7	1958	433710	6 0	11827	15,718,554	8.4	
	February	..	1156	2386860	..	..	14,527,586	8.6	
	March	17.0	2218	475640	..	12047	16,500,545	8.2	Diameter of the cylinder, 30 inches; length of the stroke, 6 feet, working double.
	April	..	1456	323850	..	..	16,082,248	8.3	
	May	..	1592	343020	..	..	15,574,228	8.2	
	June	17.7	1662	372490	..	12518	16,833,320	8.3	
	July	..	1896	390920	..	..	15,485,875	8.2	Drawing from 95 fathoms below the adit, and discharging therein the water of a 7½ inch pump, 6 ft. stroke—11.5 gallons; average, 95.2 gallons per minute.
	August	17.9	1728	371850	..	12922	16,689,973	8.3	
	September	..	1860	393800	..	..	16,415,108	8.5	
	October	..	1404	273700	..	..	15,114,322	8.3	
	November	18.6	2126	419280	..	13212	15,688,661	8.1	
	December	..	1380	306000	..	..	17,999,407	8.9	
	<i>Total</i>	<i>20416</i>				<i>Average</i>	<i>15,964,567</i>	<i>8.35</i>	
BLUE HILLS.	January	6.6	1680	194370	6 0	22016	15,283,035	4.4	
	February	5.1	1501	362090	..	16919	23,812,168	8.4	
	March	..	1032	216680	..	..	21,312,038	5.2	Diameter of the cylinder, 58 inches; length of the stroke, 7 ft. 6 ins.; working single.
	April	..	1090	229440	..	..	21,364,506	4.4	
	May	..	792	173480	..	..	22,235,887	4.4	Rd. Trevithick, Engineer.
	June	5.5	792	162180	..	18322	21,123,045	4.0	
	July	5.3	1116	173310	..	17449	16,258,527	3.6	
	August	..	918	134708	..	..	16,371,086	3.1	Drawing from 60 fathoms below the adit, and discharging therein the water of a 12 inch pump, 6 feet stroke—29.45 gallons; average, 132.25 gallons per minute.
	September	..	918	139710	..	..	16,933,321	3.1	
	October	..	720	106930	..	17377	16,484,355	2.6	
	November	..	1224	187910	..	17327	16,982,923	3.4	
	December	..	1422	260060	..	..	19,012,909	7.2	
	<i>Total</i>	<i>13195</i>				<i>Average</i>	<i>16,596,131</i>	<i>4.49</i>	

TABLE I.—Continued.

ENGINES.	Months..	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke in the pumps, feet, fms.	Load, in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.	
COOK'S KITCHEN.	January	10.5	746	169520	3 9	20098	17,126,292	4.2	Diameter of the cylinder, 36 inches; length of the stroke, 7 feet, working single. J. Pearce, Engineer.	
	February	9.3	870	281070	..	17790	21,552,738	8.1		
	March	9.6	1300	311110	3 6	19534	16,361,753	5.3		
	April	..	768	182240	..	..	16,228,393	4.3
	May	..	659	170870	..	..	17,727,178	4.4
	June	..	686	169900	..	..	16,633,798	4.4
	July	..	854	216670	..	..	17,346,734	4.3
	August	..	865	210500	..	..	16,626,213	4.3
	September	..	684	136190	..	..	13,612,827	3.9
	October	..	648	160740	..	..	17,486,867	4.0
	November	..	834	191480	..	19553	15,712,265	3.8		
	December	..	796	184280	..	..	15,843,334	4.7
	Total	9710	Average	16,834,447	4.64		
CRENNER. <i>Old.</i>	January	8.75	38116	327000	7 6	38758	24,909,327	8.4	Diameter of the cylinder, 70 inches; length of the stroke, 8 feet 3 inches; working single. A. Woolf, Engineer.	
	February	..	4000	—	..	..	—	—
	March	..	3924	353780	..	..	26,652,051	9.5
	April	..	4410	357380	..	..	23,556,689	8.0
	May	..	4572	392040	..	..	24,925,666	8.2
	June	..	3654	295800	..	..	23,531,642	7.9
	July	9.8	4050	372470	..	41408	28,561,551	7.6		
	August	..	3762	305010	7 3	..	24,339,830	7.5		
	September	..	3690	268880	..	..	21,875,318	5.6
	October	9.0	2466	216570	7 0	41310	25,395,598	5.0		
	November	..	2700	230430	..	41410	24,738,794	5.3		
	December	..	3600	303570	..	38759	22,878,468	6.8		
	Total	40644	Average	24,669,539	7.26		

TABLE I.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Constant of coat, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Length of the stroke, in feet.	Time, in minutes.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
CRENVER. <i>Oatfield.</i>	January	8.2	3510	307010	7	9	36473	24,723,801	8.0	Diameter of the cylinder, 70 inches; length of the stroke, 8 feet 0 inches; working single.
	February	..	4086	363500	..	..	..	25,419,086	8.8
	March	..	4338	390100	..	..	..	26,484,358	8.7
	April	..	3816	357540	—	8.0	A. Woolf, Engineer.
	May	..	4000	—	..	..	..	—	—
	June	8.5	3330	289500	..	..	36606	24,063,704	7.7
	July	8.6	3888	368780	36820	26,906,161	7.5	Drawing from 203 fathoms below the adit, and discharging the water at an 80 fathom level below the adit, to Crenver old engine, by which it was lifted to the adit level.
	August	8.3	3348	311850	7	6	..	25,709,481	7.7	
	September	8.4	3042	276000	..	..	36997	25,175,473	5.8
	October	..	2952	226130	21,235,415	5.2	S. Moyle, Engineer.
	November	8.6	3000	237000	..	..	37913	22,828,711	5.5
	December	..	3870	331780	..	..	..	24,376,001	7.4
<i>Total</i>				43180	<i>Average</i>	24,827,637	..	
CHACEWATER.	January	18.6	9344	332280	8	9	72928	22,692,040	0.0	Diameter of the cylinder, 88 inches; length of the stroke, 10 feet; working double.
	February	..	7680	281850	..	..	..	23,418,505	7.8
	March	..	9200	341550	..	..	..	23,690,205	7.6
	April	..	8384	330070	25,122,109	8.2	S. Moyle, Engineer.
	May	..	8928	338920	..	..	..	23,813,530	7.3
	June	..	7604	293160	..	..	..	24,409,080	6.5
	July	..	6640	200250	25,010,632	6.2	Drawing from 88 fathoms below the adit, and discharging therein the water of a 10 inch pump, 8 feet 0 inch stroke—107.67 gallons; average, 702,547 gallons per minute.
	August	..	6768	260470	..	..	..	24,558,380	5.8
	September	..	6624	239710	..	..	..	23,092,352	5.4
	October	..	6768	244350	..	..	..	23,038,507	5.6
	November	..	6912	242570	..	..	..	22,394,208	6.0
	December	..	7200	256000	..	..	..	22,688,711	6.7
<i>Total</i>				92112	<i>Average</i>	23,601,774	6.525	

TABLE I.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in Bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Feet. Fms.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
DOLCOATH <i>Great.</i>	January	16,3	4824	263440	7	51083	20,922,400	6,5	Diameter of the cylinder 63 inches; length of the stroke, 7 feet 6 inches; working double.	
	February	..	4410	251080	..	..	21,812,788	7,3
	March	..	7065	379480	..	..	20,578,531	6,4
	April	..	4392	243630	..	..	21,252,307	5,8
	May	..	3844	227550	22,679,347	5,8	Jeffree & Gribble, Engineers	
	June	16,5	3950	214200	..	51600	20,986,177	5,7	This engine draws the water 210 fathoms below the adit; and delivers it at a 40 fathom level, to the next (Shammal) engine, by a 12 inch pump, 7 feet 6 inch stroke.	
	July	..	5396	292950	..	..	21,010,313	5,8
	August	..	4684	268760	..	..	22,300,626	5,5
	September	..	3024	182570	..	..	23,364,613	5,2
	October	..	3985	213820	..	..	20,774,664	5,1
	November	16,3	4511	2388210	..	51083	20,231,347	4,7		
	December	..	4000	—	..	..	—	—
	<i>Total</i>		54065				<i>Average</i>	21,445,912		
DOLCOATH, <i>Shammal.</i>	January	8,9	896	197250	8	3	14322	26,053,951	4,9	Diameter of the cylinder 45 inches; length of the stroke, 9 feet 5 inches; working single.
	February	..	829	189270	26,976,454	5,5	
	March	..	1312	236920	..	..	25,839,420	4,8
	April	..	933	185220	..	..	23,694,066	4,7
	May	..	769	163550	25,608,440	4,2	Jeffree & Gribble Engineers	
	June	9,9	198	36550	..	16236	24,726,177	4,1	Drawing the water from the Great engine; and delivering to the pump, 8 feet stroke—46.08 gall.; average 198.14 gallons per minn.	
	July	..	964	214500	..	..	30,707,766	4,0
	August	..	1006	203700	..	..	27,122,270	4,2
	September	..	9,7	684	140250	..	15709	26,573,530	4,0	
	October	10,2	767	163400	..	16630	27,439,400	3,6		
	November	..	805	163090	..	..	28,306,894	3,3
	December	10,2	820	172730	8	0	..	28,024,389	4,4	
	<i>Total</i>		9983				<i>Average</i>	28,756,063	4,3	

TABLE I.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
DOLCOATH, <i>Stray Park.</i>	January	8.2	1726	272120	33736	31,912,770	6.8	Diameter of the cylinder, 63 inches; length of the stroke, 7 ft. 9 ins., working single.
	February	8.0	1879	340850	32196	35,042,064	9.8	Jeffree & Gribble, Engineers
	March	8.2	2725	455430	33707	33,800,761	7.7	
	April	8.8	1519	236600	34478	32,221,835	5.7	This engine draws from 140 fathoms below the adit, and discharges therein the water of an 11½ inch pump, 6 feet stroke=27,05 gallons; average, 149.58 gallons per minute.
	May	..	1378	209750	..	31,488,071	5.4	Shammal. 193,14
	June	..	1326	203070	..	31,680,757	5.4	Stray Park 149,58
	July	..	1562	238200	..	31,546,707	4.7	Total 347.72 gallons
	August	9.0	1392	205110	35920	31,756,686	4.3	of water per minute, delivered by Dolcoath engines to the adit level.
	September	..	932	140060	..	32,388,123	4.0	
	October	..	1032	153470	..	32,050,246	3.6	
	November	..	1337	182690	35928	29,455,885	3.6	
	December	8.9	1412	205370	35512	30,980,507	5.4	
<i>Total</i>		18250	..	<i>Average</i>	32,027,842	5.53		
WHEAL DRUID.	January	14.0	948	242400	5 9	9610	14,129,005	6.0
	February	..	888	249400	..	..	15,519,892	7.2
	March	..	800	—	..	—	—	Diameter of the cylinder, 38 inches; length of the stroke, 6 ft. 5 ins.; working double.
	April	..	428	130360	..	..	16,830,290	5.0
	May	..	665	203680	..	..	16,924,429	5.4
	June	..	584	190930	..	..	18,749,000	5.0
	July	..	765	241720	..	..	17,459,767	4.7
	August	..	674	196280	..	..	16,091,902	4.0
	September	..	604	126410	..	..	11,564,736	3.6
	October	..	626	148170	..	..	13,079,079	3.5
	November	..	740	189360	..	..	14,139,000	3.7
	December	..	786	201270	..	..	14,149,716	5.1
<i>Total</i>		8488	..	<i>Average</i>	15,330,619	4.84		

TABLE I.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Feet. fms.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes, per minute.	REMARKS.
WHEAL DAMSEL.	January	17.7	2678	206420	5	33564	14,160,172	4.6		
	February	16.7	2442	193900	6	31536	13,772,140	4.1		
	March	..	1862	171400	..	..	15,986,158	4.1	Diameter of the cylinder, 42 inches; length of the stroke, 7 ft. 6 ins.; working double.	
	April	..	1740	166550	..	..	16,802,163	3.7		
	May	..	1512	164130	..	..	18,828,055	3.7		
	June	..	1614	142670	..	..	15,381,986	3.3		
	July	..	1472	142780	..	..	16,823,984	3.0		
	August	..	1278	126120	..	..	17,116,793	3.0		
	September	..	1580	125870	..	..	13,880,364	2.9		
	October	..	1753	160000	..	..	16,845,521	3.5		
	November	..	1757	—	..	..	—	—
	December	..	1940	—	..	..	—	—
	Total	21628					Average	15,827,733	3.0	
WHEAL FANNY.	January	14.0	5384	426000	7	6	37400	22,194,093	8.2	
	February	..	2826	218240	..	..	21,631,825	9.4		
	March	..	6624	443780	..	..	18,792,737	7.5		
	April	..	3726	206420	..	..	15,735,515	4.8		
	May	16.8	1062	69590	..	..	21,827,932	5.3		
	June	..	3654	266920	..	..	23,397,136	6.8		
	July	..	4194	288570	..	..	22,919,916	5.7		
	August	16.1	3726	262790	..	..	22,541,859	5.4		
	September	..	2358	168570	..	..	22,882,984	4.9		
	October	..	2970	196000	..	..	21,092,272	4.6		
	November	..	3458	202010	..	..	18,673,365	4.0		
	December	16.3	3456	104190	..	..	42692	19,050,643	5.2	
	Total	43438					Average	20,891,689	5.98	

TABLE I.—Continued.

TABLE I.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in Bushels.	Number of strokes.	Length of the stroke, in the pumps. Feet. <i>In.</i>	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal. 17,767,598	Number of strokes per minute.	REMARKS.
WHEAL FRIENDSHIP, <i>Old.</i>	January	10,8	1035	155150	8 9	14142	17,767,598	4,2	
	February	..	1818	347630	..	..	22,830,189	7,3	
	March	..	1638	271257	..	..	19,771,607	5,7	Diameter of the cylinder, 40 inches; length of the stroke, 8 ft. 9 ins.; working single.
	April	11,0	1224	206820	..	14534	20,492,921	4,8	
	May	..	1242	221160	..	14730	21,919,057	5,1	T. Bratt, Engineer.
	June	..	936	170100	..	..	22,368,150	4,9	
	July	..	1512	236490	..	..	19,250,004	4,3	
	August	12,4	1242	180390	8 3	15508	18,582,348	4,4	
	September	..	1300	—	..	..	—	4,6	
	October	..	12,0	169600	8 0	..	18,264,977	4,9	
	November	10,7	1944	345360	7 6	15792	21,041,377	6,1	
	December	12,2	1728	212430	8 6	..	18,501,680	5,0	
	Total		16771			Average	20,071,809	5,1	
MILLANEAR.	September	4,9	1492	291440	6 0	16027	18,783,815	5,6	
	October	5,0	1008	203660	..	16470	19,965,953	5,0	
	November	5,9	1006	184570	..	19683	21,667,343	4,9	
	December	6,1	2292	393000	..	19990	20,565,628	7,4	
	1815								W. Sims, Engineer.
	January	4,9	3062	562200	..	21151	23,300,637	11,8	
	February	6,9	2448	473520	..	22763	26,418,470	13,1	
	March	..	2651	525380	..	..	27,067,176	12,8	
	April	..	2862	547630	..	..	26,133,546	13,6	
	May	..	3492	574100	..	..	24,564,357	11,8	
	Total		20313			Average	23,163,002	10,63	

TABLE I.—Continued.

ENGINES.	Month.	Load per square inch on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL NEPTUNE	January	5,7	1098	129900	5 9	15979	10,819,660	4,1	
	February	..	2520	309970	..	..	11,301,481	6,5	
	March	7,1	2601	310400	..	19361	13,285,382	6,6	Diameter of the cylinder 59 inches ; length of the stroke, 7 ft. 4 ins. ; working single.
	April	7,2	1971	261200	..	19858	15,131,709	6,0	
	May	8,0	2016	2299830	..	21308	13,890,242	5,3	
	June	9,4	1548	179430	6 0	24548	17,002,015	5,1	T. Bratt, Engineer.
	July	..	2088	276980	..	..	19,457,103	5,0	
	August	6,3	1782	186870	..	17174	21,524,445	8,8	Drawing from 79 fathoms below the adit ; and discharging therein the water of a 13 inch pump, 6 feet stroke = 34,56 gallons, average, 188,01 gallons per minute.
	September	9,2	1838	194120	..	24088	15,154,139	4,2	
	October	..	1482	151500	..	..	14,668,001	4,4	
	November	9,3	2574	253540	..	24362	14,300,680	4,6	
	December	..	2250	201370	..	..	12,993,645	4,8	
	Total	23768	..	..	Average	14,961,508	5,44		
POLLADRASS.	January	7,2	802	470530	6 0	3281	11,549,692	9,0	
	February	4,6	236	129250	..	2080	6,834,915	4,7	
	March	..	347	183550	..	..	6,781,279	3,3	Diameter of the cylinder 24 inches ; length of the stroke, 6 feet ; working single.
	April	..	186	103900	..	..	6,971,354	2,7	
	May	..	253	128910	..	..	6,408,208	3,1	
	June	..	234	117040	..	..	6,242,133	2,6	John Davey, Engineer.
	July	5,3	677	353440	..	2430	7,611,750	7,4	
	August	6,1	340	346880	..	2764	18,919,582	7,8	
	September	..	298	310500	..	..	15,191,577	6,7	
	October	5,3	200	193820	..	2430	14,129,478	6,0	
	November	..	328	289580	..	..	12,872,184	5,6	
	December	..	242	246370	..	..	14,843,283	7,1	
	Total	4143	..	..	Average	10,779,619	5,5		

TABLE I.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
ROSEWALL HILL.	January	7.7	680	347110	6 9	5462	16,031,377	7.3	
	February	..	511	263270	..	..	16,180,543	7.6	
	March	7.4	722	322530	..	..	14,629,608	6.6	
	April	..	655	321800	..	5275	14,901,673	7.7	
	May	..	589	289700	..	..	15,442,690	6.3	T. Ward, Engineer.
	June	..	449	221530	..	..	14,964,869	5.9	
	July	..	588	288770	..	..	14,895,719	5.9	
	August	..	528	200410	..	..	11,512,567	4.9	
	September	..	455	226620	..	..	15,106,962	4.9	
	October	..	501	237730	..	..	14,392,505	5.9	
	November	..	581	332360	..	..	17,350,936	6.7	
	December	..	572	334980	..	..	17,762,870	8.0	
		Total	6311	..	..	Average	15,264,343	6.47	
W.H. SPARNON.	October	6.0	4536	373,50	6	6	26262	14,065,310	7.8
	November	..	3816	346049	..	..	26362	15,538,519	8.0
	December	..	4446	412130	..	..	..	15,883,875	10.2
	Jan. 1815.	..	5724	517630	..	..	..	15,495,711	10.6
	February	..	4426	473490	..	..	..	18,322,928	11.7
	March	..	5076	548390	..	..	..	18,512,267	11.5
	April	..	4014	434220	6	9	18,536,347	10.7	
	May	..	4968	473070	..	..	16,944,390	10.2	
	June	..	4698	393050	..	..	14,887,333	8.8	
	July	..	4032	350560	..	..	15,471,198	8.4	
	August	..	3942	356900	..	..	16,110,612	8.0	
	September	..	3780	355520	..	..	16,736,104	8.0	
		Total	53460	..	..	Average	16,375,383	9.49	

TABLE I.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
TINCROFT.	January	8,6	1818	284580	6 9	19702	20,857,230	7,0	
	February	..	2088	368090	..	..	23,316,934	10,6	
	March	..	3024	503000	..	..	22,120,772	8,5	Diameter of the cylinder, 48 inches; length of the stroke 8 ft. 6 ins.; working single.
	April	..	1674	274130	..	..	21,777,859	6,5	
	May	..	1478	235630	..	..	21,230,326	6,0	S. Moyle, Engineer.
	June	..	1530	213670	..	..	21,086,016	5,7	
	July	..	1602	248800	..	..	20,653,816	4,9	Drawing from 108 fathoms below the adit; and discharging therein the water of a 10 inch pump, 6 feet 9 inches stroke, = 23,01 galls.; average 132,07 galls. per minute.
	August	..	1368	205770	..	..	20,003,683	4,2	
	September	..	882	129780	..	..	19,568,307	3,7	
	October	..	1026	144440	..	..	18,632,760	3,5	
	November	..	1350	166180	..	..	16,377,869	3,3	
	December	..	1530	195360	..	..	16,988,563	5,0	
	Total	19370				Average	20,217,011	5,74	
WHEAL TOWAN. New.	January	13,2	7362	355730	6 0	51877	16,262,595	8,0	
	February	..	6696	318000	..	..	14,782,165	7,6	
	March	11,7	5976	317670	..	48324	15,412,736	7,6	O. Matthews, Engineer.
	April	..	7380	423900	..	..	16,682,759	8,2	
	May	12,1	5148	307160	..	49207	17,615,876	7,9	Drawing from 78 fms. below the adit; and discharging therein the water of a 16 inch pump, 6 feet stroke, = 52,36 galls.; average 413,64 galls. per minute.
	June	..	2016	121880	..	..	17,849,253	8,3	
	Total	34578				Average	16,430,929	7,9	

TABLE I.—Continued.

ENGINEER,	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL TOWAN.	January	6,5	2466	338170	5 9	17827	14,056,819	7,6	Diameter of the cylinder, 60 inches; length of the stroke, 7 ft. 6 in.; working single.
	February	..	2502	310250	..	..	12,710,701	7,4	O. Matthews, Engineer.
	March	..	2718	333090	..	..	12,561,981	7,9	Drawing from 64 fathoms below the adit, and discharging therein the water of a 12 inch pump, 5 feet 9 inches stroke, =28.22 gallons; average, 210.52 gallons per minute.
	April	..	3420	379100	..	..	11,362,469	7,3	Old 210.52
	May	7,0	2574	282060	..	..	10,685,545	7,2	New 413.64
	June	..	1134	107090	..	..	10,070,520	7,4	Total 624.16 gallons per minute, delivered by Wheal Towan engines into the adit level.
				<i>Total</i>	14814		<i>Average</i>	11,900,006	7,46
TRESKER, BY, Cock's.	February	12,5	8200	—	5 6	33630	—	—	Diameter of the cylinder, 50 inches; length of the stroke, 7 ft. 6 in.; working double.
	March	..	42230	365620	..	..	15,987,447	8,2	W. Sims, Engineer.
	April	..	4014	355780	..	..	16,384,814	7,5	
	May	..	3618	353800	..	..	18,087,511	8,4	
	June	13,0	3456	301100	5 9	..	16,847,355	6,7	
	July	..	3762	309820	..	..	15,930,359	6,9	
	August	..	3798	334720	..	..	17,787,226	8,0	
	September	13,1	3420	342120	..	..	19,488,410	7,2	
	October	13,2	3060	301700	..	..	19,367,118	7,2	
	November	..	4014	388750	..	..	15,117,493	7,7	
	December	13,4	2988	301090	..	..	19,886,399	7,7	
				<i>Total</i>	445660		<i>Average</i>	17,489,413	6,3

TABLE 1.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pound lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
UNITED MINES, <i>Sims'.</i>	January	15.9	6848	301360	7	63761	19,641,516	6.6	Diameter of the cylinder, 63 inches; length of the stroke, 9 feet; working double. W. Sims, Engineer.
	February	..	6208	307740	..	..	22,126,108	7.6
	March	..	7746	311000	..	..	20,058,045	8.1
	April	..	7200	360000	..	..	22,316,350	7.6
	May	..	5760	316230	..	..	24,503,817	7.5
	June	..	6760	332470	..	..	25,762,211	7.4
	July	..	5984	320400	..	..	23,897,588	7.1
	August	16.6	5824	301320	..	66407	24,050,188	7.0	
	September	..	6496	312680	..	..	22,375,151	6.8
	October	..	5728	268070	..	..	21,754,900	6.4
	November	17.6	5186	267930	..	70853	25,554,424	6.2	
	December	..	7104	344560	..	..	23,987,807	7.5
		<i>Total</i>	75944	<i>Average</i>	23,002,258	7.15	
UNITED MINES, <i>Ale and Cakes.</i>	January	20.0	9232	331400	7	79105	22,009,732	7.9	Diameter of the cylinder, 63 inches; length of the stroke, 9 ft. 10 ins.; working double. W. Sims, Engineer.
	February	..	8192	300930	..	..	22,520,863	7.3
	March	..	8920	335650	..	70546	20,859,974	7.5	
	April	20.3	9155	334200	..	80338	22,728,502	7.0	
	May	..	9312	303770	..	..	20,310,687	7.2
	June	..	9209	318190	..	..	21,612,791	7.1
	July	20.8	9280	324960	..	81173	22,029,022	7.2	
	August	..	9024	314550	..	..	21,928,246	7.2
	September	..	9600	332410	..	..	21,782,922	7.5
	October	..	8240	288460	..	..	21,870,065	6.8
	November	20.5	8166	314910	..	80183	23,964,097	7.3	
	December	..	9162	337650	..	..	22,926,340	7.3
		<i>Total</i>	108482	<i>Average</i>	22,036,845	7.25	

TABLE 1.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
UNITED MINES, <i>Poldorey.</i>	January	14.5	71168	318630	7	57458	19,794,333	7.0	Diameter of the cylinder, 63 inches; length of the stroke, 9 ft. 10 ins.; working double. W. Sims, Engineer. Drawing from 110 fms. below the adit; and discharging therein the water of a 16 inch pump, 7 ft. 9 ins. stroke, = 56.9 gall. average, \$79.31 gallons per minute. Sims's 374.37 Ale & Cakes 427.02 Poldorey 379.31 Total 1180.7 gallons per minute, delivered at the adit level, by the United Mines engines.
	February	..	8000	345250	..	..	19,217,456	8.5
	March	..	81192	361300	..	..	19,639,490	8.1
	April	..	7680	324520	..	..	19,396,040	7.0
	May	..	6432	290600	..	..	20,118,786	7.0
	June	..	6624	296580	..	..	19,937,639	6.6
	July	15.0	63336	278250	..	58480	19,903,482	6.2	
	August	..	5632	240600	..	..	19,361,635	5.6
	September	..	5780	242840	..	..	19,107,629	5.2
	October	..	4752	217180	..	..	19,296,662	5.2
	November	..	4928	206860	..	58490	19,027,824	4.8	
	December	..	6400	279040	..	..	19,763,771	6.0
	<i>Total</i>	<i>77904</i>				<i>Average</i>	<i>19,547,062</i>	<i>6.44</i>	
WHEAL VOR, <i>Old.</i>	January	20.0	7098	496070	5	6	46077	17,716,418	9.6
	February	..	3752	303580	20,504,879	11.0	Diameter of the cylinder, 48 inches; length of the stroke, 7 feet, working double. J. Davey, Engineer. Drawing from 108 fms. below the adit; and discharging therein the water of a 13 inch pump, 5 feet 6 inches stroke, = 31.68 gall.; average 245.2 gallons per minute.
	March	..	6138	553550	..	..	22,854,737	9.6
	April	20.4	4060	318100	..	46181	19,900,484	8.2	
	May	..	4184	357350	..	..	22,240,292	8.1
	June	..	5087	365560	..	..	18,252,489	8.2
	July	..	4536	345530	..	..	19,348,118	7.2
	August	..	3816	301960	..	..	20,098,610	6.7
	September	21.1	4182	296240	..	47620	18,552,897	6.4	
	October	..	2988	174670	..	47623	15,311,479	5.3	
	November	..	4464	277420	..	..	16,277,699	5.5
	December	..	3906	246980	..	..	16,561,855	7.1
	<i>Total</i>	<i>54209</i>				<i>Average</i>	<i>18,801,663</i>	<i>7.74</i>	

TABLE I.—Continued.

In the latter part of 1814, Woolf's engine with two cylinders, was introduced into Cornwall ; where one, the large cylinder of which was 45 inches in diameter, was erected at Wheal Abraham. It was first reported in October of that year ; its duty being 34 millions : but the average duty for the four months was only 32,6 millions, as shewn in the foregoing Table. Soon afterwards, however, it was discovered that there was a defect in some part of the castings, which being removed, the duty advanced in the following year to 52,3 millions. No one, we suppose, now believes that Woolf's notions respecting steam of different degrees of density, as laid down in the specification of his patent, are correct : yet he did the engineers of Cornwall great service, by shewing how much advantage might be gained by working with steam of high pressure, and very expansively ; and thus leading them to adopt the present simple and effectual mode, which at length entirely superceded his more complicated and costly machines. A second engine, 53-inch large cylinder, which Woolf erected, in the following year, at Wheal Vor, did 50 millions.

In 1815, the number of engines reported was 35, and the duty averaged 20,5 millions. In this year, too, the first trial was made, in order to prove the correctness of the Monthly Reports. Stray Park engine at Dol-coath was chosen for the purpose, because its reported duty was such as led some persons to entertain doubts of its accuracy. The trial was continued for two days, to the full satisfaction of all concerned. Many of these trials have since been made for similar reasons ; and have invariably had similar results : further on we shall give a particular account of the proceedings adopted on these occasions.

In 1816, Jeffree and Gribble erected a new engine, 76-inch cylinder, single, at Dolcoath, which did 40 millions. This was the first instance of such duty having been performed by an engine of that simple construction. Sims also erected one at Wheal Chance, to which he applied the pole adopted by Trevithick in his high pressure engines: this engine attained to 45 millions. Still, however, Woolf's engines maintained the first place; the duty performed by that at Wheal Abraham, was 56,9 millions, and of that at Wheal Vor, 49,5 millions. The whole number of engines reported was 35, average duty 23 millions.

The number of engines reported in 1817, was 35: their average duty 26,5 millions. A general improvement in the engines reported had now taken place, as appears from the averages of this year and the last. Jeffree and Gribble's engine at Dolcoath reached 44 millions in some months; and Sims's engine at Wheal Chance performed 46,9. Woolf's compound engine still for a while exceeded all others; occasionally reaching 51 millions.

There was a small falling off in 1818. The number reported was 36, and the average duty 25,4 millions.

In 1819, 40 engines were reported; average duty 26,3 millions. Dolcoath engine performed the best during the whole of this year; and at one time reached 48 millions.

In 1820, 46 engines were reported; average duty 28,7 millions.

The improvement had now reached a point at which it became nearly stationary for some time: but Dolcoath engine continued to maintain a high rank; and, in July, performed 44,5 millions. Treskerby engine

too, to which Trevithick's high pressure pole had been adapted, reached 40,3 millions. And a new engine lately erected at the Consolidated Mines by Woolf, having a single cylinder 90 inches diameter and 10 feet stroke, performed in December 38,4 millions. Woolf's engines with the double cylinders, owing to the difficulty of keeping them perfect, had fallen to the average of the best simple engines ; and after this period began to be disused in the mines.

No improvement deserving notice, took place in 1821. The number of engines reported was 45 ; average duty 28,3 millions. Here we insert a Table similar to Table I, containing an alphabetical arrangement of the mines reported in this year, and a copy of the Monthly Reports.

TABLE II.—Shewing the work performed by the pumping engines reported in 1821.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes minute.	REMARKS.
WH. ABRAHAM, <i>Middle.</i>	January	9.3	36554	343520	7	3	37341	25,432,748	7.4
	February	..	2934	309850	..	..	..	28,458,730	7.6
	March	..	3798	359820	..	..	..	25,629,501	7.8
	April	..	3258	316290	..	..	..	26,236,030	8.1
	May	..	3870	383140	..	..	..	26,732,822	8.1
	June	..	3078	319010	..	..	..	28,037,900	7.9
	July	9.8	3780	388220	..	..	398892	27,516,478	7.9
	August	9.9	2916	3233470	..	..	39842	32,042,443	8.0
	September	9.6	3330	354120	..	..	38903	28,993,512	7.7
	October	..	2898	322930	..	..	39075	31,528,893	8.0
	November	..	3546	379360	..	..	39248	30,441,660	8.0
	December	..	3582	393320	..	..	..	31,268,504	8.1
	<i>Total</i>	<i>140644</i>					<i>Average</i>	<i>28,616,602</i>	<i>7.96</i>
WH. ABRAHAM, <i>Woolf's.</i>	January	18.0	1800	400710	6	9	28571	42,932,570	8.7
	February	..	1710	343710	..	..	..	38,763,704	8.5
	March	..	1692	397620	..	..	..	45,320,748	8.6
	April	..	1458	341210	..	..	..	45,328,685	8.7
	May	..	2034	436580	..	..	..	41,394,448	9.1
	June	..	1522	375370	..	..	..	47,310,112	9.2
	July	18.1	1998	436020	..	..	288892	42,559,087	8.9
	August	..	1584	363480	..	..	..	44,751,409	9.0
	September	..	1656	382860	..	..	..	45,064,454	8.3
	October	..	1395	330860	..	..	..	46,254,228	8.2
	November	..	1755	396430	..	..	..	44,052,521	8.3
	December	..	1872	409820	..	..	..	43,164,766	9.46
	<i>Total</i>	<i>20476</i>					<i>Average</i>	<i>43,969,061</i>	<i>8.74</i>

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load, in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
W.H. ABRAHAM, <i>Woolf's.</i>	January	7.6	1880	227570	7 3	31785	26,068,258	4.9	
	February	..	1800	269200	..	..	33,910,695	6.6	Diameter of the cylinder, 60
	March	10.0	2052	273550	..	35951	34,577,989	6.3	inches; length of the stroke, 8 feet 9 inches; working single.
	April	..	1584	263550	..	..	42,565,404	6.7	A. Woolf, Engineer.
	May	10.3	2070	—	..	36412	39,294,320	6.6	
	June	..	1620	235360	..	..	37,600,685	5.8	
	July	..	1818	260190	..	..	37,045,517	5.3	Drawing from 147 fathoms
	August	..	1530	213170	..	..	35,405,329	5.3	below the adit; and discharging therein the water of a 14
	September	..	1782	220750	..	..	32,060,561	4.8	inch pump, 7 feet 3 inches
	October	..	1602	210680	..	..	34,040,798	5.2	stroke, =18.43 gallons; average 290.58 gall. per minute.
	November	10.6	2520	297200	..	39587	33,301,083	6.2	
	December	..	2862	369970	..	..	35,613,247	8.3	
		<i>Total</i>	232220			<i>Average</i>	35,117,823	6.0	
BINNER DOWNS, <i>Western.</i>	January	10.5	2952	362060	7 6	37590	32,179,186	7.9	
	February	..	3366	349130	..	37868	27,385,234	8.3	
	March	10.3	3798	482920	..	38512	34,063,788	10.4	Diameter of the cylinder, 64
	April	..	2934	379900	..	..	34,718,865	10.5	inches; length of the stroke, 9 feet; working single.
	May	..	4212	527610	..	..	33,558,100	10.8	A. Woolf, Engineer.
	June	..	3438	409820	..	..	31,934,490	10.5	
	July	..	4153	540820	..	..	34,845,040	11.0	Drawing from 115 fathoms
	August	..	3618	450400	..	..	33,350,514	10.4	below the adit; and discharging
	September	..	3258	456910	..	..	37,370,960	10.5	therein the water of a 14
	October	9.5	3672	493440	..	39712	38,177,904	10.4	inch pump, 7 feet 6 inches
	November	..	3258	432720	..	..	39,630,537	10.3	stroke, =53.75 gals.; average 550.93 gals. per minute.
	December	10.0	4176	503110	..	42079	34,874,341	12.0	
		<i>Total</i>	42840			<i>Average</i>	34,357,414	10.25	

TABLE II.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal in bushels.	Length of the stroke in the pump.	Number of strokes.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
W.H. BEAUCHAMP.	January	10.9	930	181680	15050	16,903,658	3,8	Diameter of the cylinder, 36 inches; length of the stroke, 7 ft. 9 ins.; working single.	
	February	11.2	708	128260	15418	16,061,307	3,2		
	March	11.4	783	156050	16178	18,539,357	3,3		
	April	11.5	600	99030	16440	16,962,176	2,6	A. Wolf, Engineer.	
	May	11.6	563	111390	16702	19,000,898	2,3		
	June	..	624	121230	..	18,657,860	2,8		
	July	..	657	116760	15866	16,213,023	2,4	Drawing from 110 fathoms below the adit; and discharging therein the water of a 12 inch pump, 5 ft. 9 ins. stroke; =28,23 galls.; average 92,02 gallons per minute.	
	August	12.0	448	94200	16320	19,973,343	2,3		
	September	..	488	94070	..	18,310,879	2,4		
	October	..	670	125340	..	17,770,218	2,6		
	November	8.4	520	152040	11284	18,970,791	3,6		
	December	..	640	171610	..	17,397,768	3,96		
<i>Total</i>		7631	<i>Average</i>	17,783,356	5,917		
WHEAL BASSET.	January	14.4	1350	508570	5	6	9200	19,901,958	10.7
	February	15.8	1332	523930	..	10010	21,655,390	10.4	Diameter of the cylinder, 24 inches; length of the stroke, 7 ft. 6 ins.; working double.
	March	..	936	314610	..	..	18,505,186	10.8
	April	..	1476	543570	..	..	20,275,284	11.1
	May	..	1260	470650	20,564,790	10.9	Sims & Son, Engineers.
	June	..	954	294500	..	..	16,895,490	7.3
	July	..	1134	464600	..	..	22,566,043	9.2
	August	9.5	612	313000	..	5514	16,510,377	6.6	Drawing from 34 fathoms below the adit; and discharging therein the water of a 10 inch pump, 5 feet 6 inches stroke, =18,75 galls.; average 191,62 galls. per minute.
	September	..	620	—	..	..	—	—
	October	..	630	454860	..	..	21,896,194	9.0
	November	..	792	512130	..	..	19,610,311	11.1
	December	..	846	637060	..	..	21,837,019	16.2
<i>Total</i>		11942	<i>Average</i>	19,909,816	10.22		

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in Bushels.	Number of strokes.	Length of the stroke, in pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
CRINNES.	January	10.4	3470	407760	7 3	27474	23,406,422	4.7	
	February	..	1810	211730	..	..	23,300,418	5.2	
	March	..	1576	200430	..	..	25,331,821	4.5	Diameter of the cylinder, 58 inches; length of the stroke, 8 ft. 9 ins.; working single.
	April	10.1	1473	197390	..	26610	25,862,662	5.0	J. Webb, Engineer.
	May	..	1851	248260	..	..	26,876,170	5.0	
	June	..	1408	187700	..	..	25,718,493	4.6	
	July	..	1674	212680	..	..	26,067,826	4.3	
	August	..	1160	166950	..	..	27,766,861	4.0	Drawing from 41 fathoms below the adit; and discharging therein the water of a 16 inch pump, 7 feet stroke, = 61.08 gallons; average 307.84 gallons per minute.
	Sept.	..	..	..	..	..	..	..
	October	7.9	4188	621400	7 0	21340	22,164,453	4.7	
	Nov.	..	2506	358200	..	..	21,351,921	7.8	
	December	..	..	..	..	..	24,683,498	5.04	
W.H. CLOWANCE, West.	January	17.1	2000	..	..	21470	..	..
	February	..	1870	362850	7 6	..	31,244,877	8.6	
	March	..	2204	400800	..	..	29,282,586	8.2	Diameter of the cylinder, 40 inches; length of the stroke 7 ft. 6 ins.; working single.
	April	..	1500	..	..	..	..	..	Jefree & Gribble, Engineers
	May	..	2200	..	..	..	26,101,522	7.4	
	June	..	2256	286830	..	..	17,275,328	6.6	
	July	14.7	1840	282230	..	18412	15,864,978	4.7	
	August	..	1706	198000	..	..	12,697,997	3.6	Drawing from 99 fathoms below the adit; and discharging therein the water of a 10 $\frac{1}{4}$ inch pump, 7 feet 6 ins. stroke, = 29.54 gallons; average 173.1 galla. per minute.
	September	..	1764	162080	..	..	..	..
	October	15.0	2064	140350	..	19883	..	..
	November	..	2000	..	..	..	..	..
	December	..	1769	..	..	..	..	..
	Total	..	23173	..	..	..	..	..
							Average	21,909,548	5.86

TABLE II.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps. <i>Feet. Ins.</i>	Load, in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes, per minute.	REMARKS.
CRENVER, <i>Old.</i>	January	10,3	3258	297490	7 6	44716	30,622,842	6,4	
	February	..	3438	335890	..	..	32,765,395	8,3	
	March	..	3762	384600	..	..	34,285,832	8,4	Diameter of the cylinder, 70 inches; length of the stroke, 8 ft. 6 ins.; working single.
	April	..	3456	349430	..	..	33,431,058	9,0	
	May	..	4086	398600	..	..	32,716,221	8,4	A. Woolf, Engineer.
	June	10,6	3150	312190	..	47686	34,341,643	7,7	
	July	..	3510	336430	..	..	33,212,398	6,8	
	August	10,7	2808	268350	..	48086	31,770,556	6,3	Drawing from 210 fathoms below the adit; and discharging therein the water of a 16 inch pump, 7 feet 6 inches stroke.—65.45 galls.; average 480.4 gallons per minute.
	September	10,8	3474	291370	..	48676	29,373,517	6,3	
	October	..	2718	243950	..	..	31,433,469	6,0	
	November	..	2276	304630	..	48836	32,622,190	6,4	
	December	11,0	3474	353310	..	49864	36,070,876	8,17	
	<i>Total</i>	<i>39410</i>				<i>Average</i>	<i>32,720,499</i>	<i>7.34</i>	
CRENVER, <i>Oatfield.</i>	January	11,0	3276	305290	7 6	47980	33,541,362	6,6	
	February	10,0	3348	339810	..	43801	33,342,333	8,4	
	March	..	3834	385000	..	..	32,887,842	8,4	Diameter of the cylinder, 70 inches; length of the stroke, 8 ft. 6 ins.; working single.
	April	..	3492	357790	..	..	33,658,848	9,2	
	May	..	4086	428360	..	..	34,439,420	9,0	
	June	10,4	3204	314050	..	45895	33,739,402	7,8	
	July	11,0	3564	357000	..	47980	36,050,315	7,3	
	August	..	2736	—	..	..	—	—
	September	..	3564	305420	..	..	30,844,077	6,6	
	October	10,0	2736	259520	..	43801	31,160,185	6,4	
	November	..	3366	345460	..	..	33,715,448	7,2	
	December	..	3438	336260	..	..	34,998,846	8,46	
	<i>Total</i>	<i>40644</i>				<i>Average</i>	<i>33,497,824</i>	<i>7.7</i>	

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch on the piston.	Consumption of coal in Bushels.	Number of strokes.	Length of the stroke, in the pumps. Feet, fms.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
CHACEWATER.	January	15.3	8224	289370	8 6	60920	21,604,004	6.25	
	February	..	6483	249860	..	..	19,924,436	6.6	Diameter of the cylinder, 66 inches; length of the stroke, 10 feet; working double.
	March	14.1	5691	281500	7 6	56932	21,120,661	6.7	
	April	..	6374	307000	..	..	23,306,252	6.7	
	May	..	7649	—	..	..	—	—	Sims & Son, Engineers.
	June	17.6	6514	240030	8 6	70818	22,180,980	6.4	
	July	18.2	6521	211750	..	73212	20,207,398	5.2	
	August	..	7361	218330	..	..	18,457,708	4.9	
	September	..	7440	212360	..	..	18,760,938	4.3	
	October	..	6446	208130	..	..	20,093,036	4.0	
	November	..	6868	191860	..	..	17,384,225	4.43	
	December	..	6432	182360	..	..	17,643,500	4.5	
	Total	82003	—	—	Average	20,070,283	6.44		
COOK'S KITCHEN.	January	11.4	1000	329900	—	—	26,507,300	7.1	
	February	..	1000	—	—	—	—	—	
	March	..	216	73850	—	—	27,471,345	8.5	
	April	..	936	366700	—	—	31,428,805	8.2	
	May	..	754	324650	—	—	34,586,107	7.5	
	June	9.6	838	324210	—	—	26,430,659	7.5	
	July	6.3	546	281120	—	—	22,111,169	6.7	
	August	..	524	245400	—	—	20,112,028	6.5	
	September	..	500	—	—	—	—	—	
	October	..	570	275540	—	—	20,759,763	6.0	
	November	..	432	211900	—	—	21,064,920	5.1	
	December	..	720	463520	—	—	27,647,036	11.1	
	Total	8036	—	—	Average	25,818,853	6.57		

TABLE II.—Continued.

ENGINES.	Mouths.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke in the pumps.	Load, in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL CHANCE, <i>Sims's.</i>	January	17,1	2052	331560	6 0	34126	33,084,258	7,4	Diameter of the cylinder, 45 inches; length of the stroke, 7 ft. 11 ins.; working single. Sims and Son, Engineers.
	February	16,7	2124	338360	..	35046	32,618,286	8,4	
	March	..	2340	363640	..	..	32,677,249	8,1
	April	..	2016	283400	30,602,667	8,1	Drawing from 51 fathoms below the adit; and discharging therein the water of a 14 inch pump, 6 feet stroke, = 40,08 galls.; average, 328,25 gallons per minute. A. Woolf, Engineer.
	May	..	2862	411620	..	..	30,242,420	8,6
	June	16,8	2876	357160	..	35680	32,192,438	8,3	
	July	17,0	2610	424350	..	35956	35,085,453	8,4	
	August	..	1980	353910	..	..	35,392,263	8,0
	September	16,9	2448	347220	..	30272	30,888,538	7,8	
	October	..	2368	306700	..	..	28,306,997	7,6
	November	..	3150	409460	..	..	28,606,798	7,88
	December	16,7	2412	390460	..	35250	34,298,097	9,7	
	<i>Total</i>	<i>269228</i>				<i>Average</i>	<i>31,932,949</i>	<i>8,19</i>	
CARZISE.	January	12,0	432	366100	4 9	4743	19,092,496	6,0	Diameter of the cylinder, 22 $\frac{1}{2}$ inches; length of the stroke, 4 feet 9 inches; working single. A. Woolf, Engineer.
	February	..	400	—	..	..	—	7,0
	March	..	344	348260	..	..	22,808,245	7,6
	April	..	616	515300	18,846,302	14,3	Drawing from 40 fms. below the adit; and discharging therein the water of a 9 inch pump, 4 feet 9 ins. stroke, = 13.11 galls.; average, 146,96 gallons per minute. A. Woolf, Engineer.
	May	..	800	689690	..	..	19,422,748	14,1
	June	..	660	506310	..	..	17,283,008	12,5
	July	..	672	541460	..	..	18,152,809	11,0
	August	13,0	636	543200	..	5185	21,422,365	10,9	
	September	13,3	580	370820	..	5295	16,080,321	9,9	
	October	13,4	970	616220	..	5332	16,033,584	11,2	
	November	13,5	724	482280	..	5368	16,985,048	13,4	
	December	..	892	637860	..	—	18,895,060	16,3	
	<i>Total</i>	<i>7726</i>				<i>Average</i>	<i>18,632,907</i>	<i>11,18</i>	

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in inches.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
CONSOLIDATED MINES, <i>Wheat Fortune.</i>	January	6.5	4000	—	7	54429	—	3.73	Diameter of the cylinder 90 inches; length of the stroke 9 ft. 11 ins.; working single. A. Woolf, Engineer.
	February	7.4	2800	335160	6	54429	—	3.73	
	March	7.4	4128	287220	..	62343	27,347,554	5,4	
	April	..	4000	—	..	..	..	5,4
	May	9.4	4224	232160	..	79848	32,914,615	5,2	
	June	..	4113	223880	..	..	32,764,209	5,2
	July	9.2	3640	220810	7	77233	33,975,880	5,1	
	August	9.5	4100	220530	7	6	32,688,193	4.9	
	September	9.7	4128	214310	..	81705	31,812,103	5,0	
	October	..	4140	223100	..	82338	33,273,275	5,0	
	November	9.9	4352	219800	..	84316	31,938,172	5,2	
	December	..	4950	263000	..	..	33,253,719	5,5
		<i>Total</i>	48575	—	—	<i>Average</i>	32,219,191	4.94	
CONSOLIDATED MINES, <i>Job's.</i>	January	6.6	3710	335160	7	6	55874	37,857,270	8.3
	February	..	3240	287220	37,148,449	6.63
	March	..	3280	309250	39,509,987	6.9	A. W. Colf, Engineer.
	April	6.8	3080	261360	..	57948	36,879,762	6.3	
	May	7.0	3328	260110	..	58790	34,461,339	5.8	
	June	7.1	3300	—	..	60300	—	5.4	
	July	7.2	3080	207120	..	61024	30,422,787	4.8	
	August	..	2832	190280	..	..	30,468,948	4.2
	September	7.5	2848	177130	..	65180	29,624,907	4.1	
	October	..	2800	—	..	..	—	4.0
	November	..	2600	—	..	..	—	5.0
	December	7.6	3490	252190	..	67266	35,058,203	5.5	
		<i>Total</i>	37588	—	—	<i>Average</i>	34,602,944	5.55	

TABLE II.—Continued.

ENGINES	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in pounds.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
DOLCOATH, <i>Great.</i>	January	11.4	2952	272140	7 6	64515	44,606,483	5,9	
	February	..	2913	260750	..	..	43,311,756	6,0	Diameter of the cylinder, 76 inches; length of the stroke, 9 feet; working single.
	March	..	2592	224410	..	..	41,381,428	5,6	
	April	..	3168	269860	..	..	41,215,323	6,0	
	May	11.5	2928	246650	..	64860	40,977,763	5,7	Jeffree & Gribble, Engineers
	June	..	2619	222880	..	..	41,397,478	5,1	
	July	..	2003	144100	..	..	46,638,353	5,3	Drawing from 200 fms. below the adit; and discharging therein the water of a 12 inch pump, 7 feet 6 inches stroke, = 36.81 gals.; average 207.6 gallons per minute.
	August	..	2817	231150	..	..	39,915,838	5,2	
	September	..	2900	237800	..	..	39,670,030	5,2	
	October	..	2916	207520	..	..	39,774,666	5,0	
	November	..	2538	207520	..	61404	43,145,930	7,4	
	December	11.2	3303	309450	..	..	..	..
DOLCOATH, <i>Stray Park.</i>	<i>Total</i>		33649				<i>Average</i>	42,049,549	5,64
	January	7.4	1371	181130	5 6	34751	25,251,252	4,0	
	February	..	1638	220300	..	..	25,705,768	5,1	Diameter of the cylinder, 64 inches; length of the stroke, 8 feet; working single.
	March	..	1347	173280	..	..	24,587,289	4,3	
	April	7.8	1442	197360	..	36780	27,686,514	9,7	Jeffree & Gribble, Engineers
	May	7.9	1494	207140	..	37222	28,384,141	4,8	
	June	..	1280	164500	..	..	26,727,463	3,8	Drawing from 178 fms. below the adit; and discharging therein the water of a 11 $\frac{1}{4}$ inch pump, 5 ft. 6 ins. stroke, = 25.98 gals; average, 120.54 gallons per minute.
	July	..	1269	179000	..	..	28,877,115	3,7	
	August	..	1098	139300	..	..	25,972,345	3,3	
	September	..	1138	144200	..	..	25,940,921	3,2	
	October	8.0	1126	153026	..	37739	28,028,494	3,3	
	November	..	1248	166320	..	..	27,861,960	4,0	
	December	..	1950	271830	..	..	28,934,491	6,5	
	<i>Total</i>		16381				<i>Average</i>	26,146,380	4,64

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL DAMSEL. <i>Sims's.</i>	January	16.8	1480	225020	6 0	33040	23,727,040	4.4	
	February	..	1260	153480	..	..	24,147,520	4.1	
	March	..	1800	—	..	..	—	—
	April	..	1238	139870	5 6	..	27,870,093	4.7	Diameter of the cylinder, 42 inches; length of the stroke, 7 ft. 6 ins.; working single.
	May	..	1480	172780	5 9	..	22,176,314	4.0	Sims and Son, Engineers
	June	..	1389	169320	..	..	23,188,685	3.9	
	July	..	1292	161360	..	..	23,726,913	3.73	Drawing from 135 fathoms below the adit; and discharging therein the water of a 114 inch pump, 5 feet 9 inches stroke, =24.8 gallons; average, 97.46 galls. per minute.
	August	..	1308	156670	..	..	22,755,479	3.5	
	September	..	1340	151220	..	..	21,439,384	3.4	
	October	..	1312	149570	..	..	21,658,009	3.3	
	November	..	1520	172430	..	..	21,551,481	3.7	
	December	..	1370	188340	..	..	23,540,021	4.5	
	<i>Total</i>	<i>17189</i>				<i>Average</i>	<i>23,252,867</i>	<i>3.93</i>	
W.H. HARMONY.	January	17.0	2178	4364950	5 0	23552	25,192,835	9.2	
	February	..	2412	6304500	..	..	27,619,211	10.5	
	March	..	1440	286180	..	..	24,954,543	9.9	
	April	..	2376	489000	..	..	25,844,349	10.0	Diameter of the cylinder, 36 inches; length of the stroke, 6 ft. 8 ins.; working single.
	May	18.7	1872	334670	..	23354	26,051,118	8.9	Jeffree & Gribble, Engineers
	June	..	1638	310000	..	..	23,983,394	7.7	
	July	18.8	2016	364900	..	23921	22,947,069	7.2	Drawing from 88 fathoms below the adit, and discharging therein the water of a 114 inch pump, 6 feet stroke, =27.05 gallons; a average, 232.9 gallons per minute.
	August	..	1440	270990	..	..	24,416,886	6.7	
	September	..	1692	298920	..	..	22,998,466	6.3	
	October	..	1500	—	..	..	—	—
	November	..	1530	255660	..	..	21,747,809	7.0	
	December	..	2556	499130	..	..	25,415,402	11.5	
	<i>Total</i>	<i>22650</i>				<i>Average</i>	<i>24,652,807</i>	<i>8.61</i>	

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pump. Feet. $\frac{Inches}{7}$.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
GREAT HEWAS.	January	11.7	5504	562660	7 0	39387	28,185,033	6.4	Diameter of the cylinder, 58 inches; length of the stroke, 8 ft. 9 ins.; working single. W. Sims, Engineer.
	February	11.4	2960	353900	..	38385	32,125,302	9.1	
	March	..	3392	386180	..	..	30,590,989	8.6
	April	..	2800	333850	..	..	32,037,080	8.5
	May	..	3728	427210	..	..	30,791,081	8.4
	June	11.1	2592	292700	..	37383	29,550,165	7.5	
	July	..	3136	295530	..	..	24,660,263	6.0
	August	8.1	2000	210120	..	26890	19,775,443	5.0	
	September	9.8	2080	241400	..	32388	26,312,135	5.0	
	October	..	1792	222900	..	..	28,086,468	5.0
	November	..	2112	259120	..	..	27,839,321	6.0
	December	..	2448	355860	..	..	32,938,648	7.7
		Total	34544	Average	28,576,828	6.93	
W.H. NEPTUNE.	January	9.7	1098	166600	6 0	27014	24,380,574	4.6	Diameter of the cylinder, 52 inches; length of the stroke, 7 ft. 8 ins.; working double. A. Woolf, Engineer.
	February	..	1386	216000	..	..	25,041,584	5.4
	March	9.9	1772	271200	..	27418	24,947,072	5.9	
	April	10.1	1412	231560	..	27642	26,943,367	6.6	
	May	..	2220	343000	..	..	25,481,964	6.8
	June	..	1630	250500	..	..	27,002,753	6.4
	July	..	2042	308700	..	..	24,932,891	5.5
	August	10.3	1366	193760	..	28663	24,169,361	5.0	
	September	..	1230	—	..	..	—	—
	October	..	1358	186050	..	..	23,344,269	4.8
	November	11.4	2100	232980	..	31400	25,163,090	4.9	
	December	..	1742	212760	..	..	22,816,739	7.4
	Total	19256	Average	24,929,424	5.75	

TABLE II.—Continued.

ENGINES.	Mouths	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a basket of coal.	Number of strokes per minute.	REMARKS.
PEMBROKE,	January	10.2	4512	515240	6 0	39002	28,548,972	5,96	
	February	11.2	2216	269100	..	41682	32,312,127	6,64	
	March	11.7	2620	260400	..	44157	29,038,846	5,8	Diameter of the cylinder, 60 inches; length of the stroke, 8 ft. 6 ins.; working single.
	April	11.8	2496	263200	..	44663	29,944,456	6,7	
	May	..	3240	324710	..	29,335,859	6,8		
	June	6.6	1832	270460	..	30,332,938	6,8		
	July	..	2360	324410	..	26440	21,806,950	6,6	
	August	5.7	1960	276220	..	..	22,358,908	6,6	
	September	..	1976	294210	..	22885	20,426,452	6,2	
	October	4.4	1500	222440	..	..	20,344,382	5,3	
	November	..	1296	238410	..	17732	19,407,509	5,5	
	December	..	1728	309800	..	..	19,074,791	6,7	
		<i>Total</i>	27636			<i>Average</i>	25,244,189	6,3	
PENBERTH CROFTS.	January	10.9	2628	154000	7 3	45472	19,318,678	4,3	
	February	10.7	3368	220050	..	43898	20,806,067	5,4	
	March	10.9	3654	243580	..	45022	21,757,060	5,3	
	April	..	4010	272670	..	..	22,172,914	5,56	Diameter of the cylinder, 64 inches; length of the stroke 9 ft. 3 ins.; working single.
	May	..	2938	215000	..	44938	23,443,328	6,0	
	June	11.3	3258	250870	..	46525	25,972,995	6,4	
	July	11.3	5040	388160	..	..	26,180,529	6,8	
	August	11.5	4068	307600	..	47138	25,841,311	7,1	
	September	..	3636	265400	..	..	24,945,154	6,8	
	October	..	3132	221670	..	..	24,187,686	5,7	
	November	16.6	3850	281080	..	48002	25,407,770	6,0	
	December	11.1	4646	362560	..	45753	25,885,601	8,0	
		<i>Total</i>	44276			<i>Average</i>	23,826,591	6,11	

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Load in feet, lbs.	Number of strokes per minute.	REMARKS.
POLDICE, Sims's.	January	13.6	6788	3965510	6 9	51124	20,106,859	9.8	Diameter of the cylinder, 64½ inches; length of the stroke, 7 ft. 9 ins.; working double. A. Woolf, Engineer.
	February	..	7870	377290	..	..	16,543,567	8.13
	March	14.7	8130	338640	..	55385	15,571,973	8.1	
	April	..	8480	408630	..	..	17,926,664	9.4
	May	..	7636	364480	..	..	17,844,472	8.7
	June	14.9	7298	368990	..	57165	21,677,904	8.2	
	July	14.9	7590	351440	7 6	..	18,851,845	7.0	
	August	..	6150	279490	..	..	18,484,202	6.9
	September	..	6150	—	..	..	—	—
	October	..	6000	—	..	..	—	—
	November	..	5000	—	..	..	—	—
	December	18.6	4430	—	..	69515	—	—	
	<i>Total</i>		81520				<i>Average</i>	18,625,948	8.28
POLDICE, Oppie's.	January	11.0	3900	342430	6 6	47986	27,371,571	7.4	Diameter of the cylinder, 60 inches; length of the stroke, 7 feet; working single. Sims & Son, Engineers.
	February	11.27	2560	233070	..	49028	29,013,755	5.4	
	March	..	2429	227810	..	..	29,888,409	5.3
	April	11.3	1650	195330	..	49322	37,952,382	4.6	
	May	11.4	1713	209150	..	49616	39,376,364	5.1	
	June	..	1824	231320	..	..	40,900,013	5.3
	July	..	1860	228510	..	..	39,621,176	4.9
	August	..	1600	200780	..	..	40,466,189	4.5
	September	..	2240	250620	..	..	36,083,014	4.8
	October	..	1440	158430	..	..	35,482,158	4.5
	November	..	1920	222120	..	..	37,309,981	5.1
	December	..	3296	343700	..	..	33,630,043	7.5
	<i>Total</i>		26432				<i>Average</i>	35,591,229	5.36

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch on the piston	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumps. Frs. fms.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.	
									7,2	8,9
WHEAL ROSE, <i>Newlyn.</i>	January	12,5	1640	281150	6 0	25146	25,865,114	7,2	Diameter of the cylinder, 45 inches; length of the stroke, 8 feet; working single. W. Sims, Engineer.	
	February	7,3	1760	398400	..	15502	20,948,839	8,9		
	March	..	1597	367690	..	..	26,265,771	9,0
	April	9,1	1920	455410	..	18456	22,812,500	8,4		
	May	9,2	1682	327400	..	19533	21,272,528	7,1	Drawing from 86 fathoms below the adit; and discharging therein the water of a 15 ¹ / ₂ inch pump, 6 feet stroke, = 51.54 gallons; average 418.5 gallons, per minute.	
	June	9,3	1856	328900	..	20007	25,306,878	—		
	July	9,5	1800	..	..	20400	21,882,679	6,8
	August	9,6	1705	304820	..	20692	26,668,888	6,6		
	Sept.	..	1536	317450	..	..	30,309,974	7,6
	October	11,2	1555	328970	..	23877	29,295,535	8,9		
	Nov.	12,8	2032	384760	..	25786	28,768,974	9,5		
	December	..	2275	428000	..	..	..	..
WHEAL SQUIRE, <i>Gwennap.</i>	Total	21358	Average	25,307,880	8,12	..	Diameter of the cylinder, 63 inches; length of the stroke 9 feet; working single. W. Sims, Engineer.	
	January	10,0	1840	198700	7 0	41885	31,661,873	4,45		
	February	10,5	1970	222070	..	42191	33,292,125	5,1		
	March	..	2390	248770	..	..	30,740,998	5,2
	April	..	2254	222680	..	..	29,177,303	5,5
	May	10,7	2520	244680	..	42967	29,203,237	5,6		
	June	..	2344	205550	..	..	26,370,502	5,2
	July	11,0	2418	216020	..	44145	27,606,873	4,6		
	August	10,8	2620	235460	..	43807	27,558,615	5,2		
	September	11,4	2160	187850	..	46015	28,012,696	4,2		
	October	11,5	2082	173730	..	46321	27,056,403	3,9		
	November	11,6	2390	209920	..	46730	28,897,900	4,6		
	December	..	2960	252570	..	..	27,911,544	6,0
Total	27948	..	..	..	Average	28,957,430	4,97	..

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump. <i>Feet. Ins.</i>	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes, per minute.	REMARKS.
TINCROFT, <i>New.</i>	January	5,3	2178	381600	7 0	23980	41,196,429	8,3	Diameter of the cylinder, 66 inches; length of the stroke, 9 feet working single.
	February	..	1872	331130	..	..	41,633,406	7,7
	March	7,6	1827	282800	..	33990	36,432,596	7,0	
	April	8,2	2646	409270	..	36406	37,942,082	9,1	Jeffree & Gribble, Engineers.
	May	..	2484	308140	..	..	39,371,463	9,2
	June	..	2304	347330	..	..	36,979,489	8,0
	July	..	2090	339220	..	38239	40,818,391	7,1	Drawing from 120 fathoms below the adit; and discharging therein the water of a 14 inch pump, 7 feet stroke, = 47,6 gallons; average 366,52 gallons per minute.
	August	8,4	1710	261600	..	..	38,202,324	6,2
	September	..	1684	262380	..	..	41,364,107	5,9
	October	..	1548	277550	..	..	44,773,225	6,2
	November	..	2070	336900	..	..	40,642,346	8,1
	December	..	2304	406850	..	..	44,096,077	9,7
	<i>Total</i>	<i>24617</i>				<i>Average</i>	<i>40,287,861</i>	<i>7,7</i>	
TRESKERBY, <i>Teague's.</i>	January	13,8	1746	246850	6 0	47292	40,116,942	6,5	Diameter of the cylinder, 58 inches; length of the stroke, 7 ft. 9 ins.; working single.
	February	..	1782	231930	..	..	36,803,386	6,7
	March	..	2034	276220	..	..	38,553,912	6,2
	April	..	1600	—	—	—	Sims and Son, Engineers.
	May	..	2286	340310	..	..	42,241,313	7,1
	June	..	1926	282600	..	..	41,631,639	6,5
	July	..	1908	322490	47,959,739	6,4	Drawing from 100 fathoms below the adit; and discharging therein the water of a 10 inch pump, 6 feet stroke, = 59,36 gallons; average 331,43 gallons per minute.
	August	..	1710	253220	..	..	42,018,527	6,2
	September	..	1908	260500	..	..	38,740,773	5,8
	October	14,7	1728	232810	..	50921	41,180,590	5,7	
	November	..	2646	339350	..	..	39,180,365	6,5
	December	..	2574	325700	..	..	38,659,603	8,1
	<i>Total</i>	<i>23848</i>				<i>Average</i>	<i>40,642,417</i>	<i>6,33</i>	

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load, in pounds.	Pounds lifted one foot high by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
TRESKERBY, <i>Cock's.</i>	January	16.4	1152	106480	5 9	39370	20,727,689	2.3	Diameter of the cylinder, 50 inches; length of the stroke, 7 ft. 7 ins.; working double.
	February	..	1188	118220	..	..	22,527,228	2.9	Sims and Son, Engineers.
	March	..	1368	134680	..	..	22,286,931	3.0	Drawing from 94 fathoms below the adit; and discharging therein the water of an 11 inch pump, 6 feet 9 inches stroke, = 23.71 gallons; average 64.72 gallons per minute.
	April	..	1332	142400	..	..	24,201,318	3.9	Teague's 331,43
	May	..	1242	123770	..	..	22,559,374	2.6	Cock's ... 64.72
	June	18.6	1350	127680	..	48265	26,247,579	2.9	Total ... 396,15 gallons per minute from Treskerby Mine.
	July	..	1440	131520	..	..	25,347,169	2.6	
	August	..	1170	101960	..	..	24,184,889	2.5	
	September	..	1242	105900	..	..	23,663,256	2.3	
	October	..	1260	95630	..	..	21,063,171	—	
	November	..	1332	97430	..	..	20,299,653	2.26	
	December	..	1400	—	..	..	—	—
		<i>Total</i>	16476			<i>Average</i>	23,009,841	2.73	
TING-TANG, <i>Cock's.</i>	January	7.6	1390	225860	6 9	26396	28,951,189	4.46	
	February	..	1170	190820	..	..	29,058,950	5.1	
	March	7.7	1670	281100	..	27691	29,223,530	5.5	Diameter of the cylinder, 63 inches; length of the stroke, 7 ft. 9 ins.; working single.
	April	..	1302	219260	..	..	31,476,819	5.4	J. Sims, Engineer.
	May	8.2	1430	225560	..	29440	31,344,953	5.2	
	June	9.1	1328	215410	..	32590	35,682,562	5.0	
	July	9.6	1344	185820	..	34406	32,109,322	4.3	Drawing from 90 fathoms below the adit; and discharging therein the water of a 14
	August	..	1152	165840	..	..	33,432,965	3.7	inch pump, 6 feet 9 inches stroke, = 46.09 gallons; average 211.02 gallons, per minute.
	September	9.7	1210	156190	..	34968	30,487,892	3.5	
	October	8.1	1152	162810	..	31560	28,257,911	3.4	
	November	8.2	1280	192900	..	32085	31,857,090	4.2	
	December	..	1860	267130	..	32347	31,357,938	6.4	
		<i>Total</i>	16288			<i>Average</i>	31,105,425	4.68	

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
SOUTH WHEAL TOWAN	January	24.4	666	204900	4 9 F. eet. I.n.	7672 7378	22,155,200 21,230,801	11.2 12.0	Diameter of the cylinder, 20 inches; length of the stroke, 4 feet 9 ins.; working double.
	February	23.5	1004	608230	..	..	..	..	•J. Gray, Engineer.
	March	..	95.0	485100	..	..	18,022,374	11.8	
	April	..	928	47260	..	..	20,383,614	11.2	
	May	..	1000	581630	..	..	22,651,383	10.7	
	June	24.4	822	511200	..	..	22,571,333	10.3	
	July	..	600	371820	..	..	22,234,426	10.0	
	August	..	800	488360	..	..	20,505,024	10.3	
	September	..	812	474020	..	..	21,107,128	10.0	
	October	..	600	347700	..	..	20,905,130	10.5	
	November	..	768	439650	..	..	21,182,602	10.35	
	December	..	1005	584480	..	..	..	..
WHEAL VOR, Pearce's	Total	9983	..	..	Average	21,177,165	10.89	..	..
	January	14.4	4348	335500	6	3	57420	27,691,481	8.6
	February	14.7	5260	406700	..	..	58750	28,396,730	8.8
	March	..	4068	378530	..	..	..	25,155,156	7.7
	April	15.4	6471	432500	..	..	60396	25,229,166	7.9
	May	15.5	3899	239100	..	..	60910	23,345,058	7.5
	June	..	4798	330340	..	..	..	26,210,151	7.4
	July	..	5594	378750	..	..	..	25,755,007	7.5
	August	..	5368	373510	..	..	..	26,991,137	8.1
	September	..	6954	383000	..	..	..	24,488,295	8.3
	October	15.7	4925	310120	..	..	62670	24,987,739	8.0
	November	..	6342	369440	..	..	..	24,484,483	8.3
	December	14.6	4750	353150	..	..	58404	27,138,648	9.0
	Total	61675	..	..	Average	25,824,266	8.1	..	..

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL VOR, <i>Woolf's</i>	January	17.7	3348	2883430	7	48344	29,671,260	7.2	
	February	..	4554	3688920	3	48340	28,391,205	8.0	
	March	..	3654	550465	..	..	31,094,365	9.0	Diameter of the cylinder, 53 inches; length of the stroke, 8 feet 9 ins.; working single.
	April	..	5986	486120	..	..	28,461,083	8.9	T. Bratt, Engineer.
	May	18.8	3060	266000	..	41180	32,255,107	8.4	
	June	..	41196	3860070	..	..	31,865,079	8.0	
	July	..	4248	381940	..	..	33,364,757	7.6	
	August	..	3384	327000	..	..	35,752,727	7.1	Drawing from 126 fms, below the adit; and discharging therein the water of a 18 inch pump, 7 feet 3 ins. stroke, = 41.76 gallons; average 338.25 gallons, per minute.
	September	..	3583	299800	..	..	31,047,192	6.5	
	October	..	3611	289510	..	..	30,077,463	7.4	
	November	..	5310	430070	..	..	30,052,659	9.0	
	December	18.5	4713	385550	..	49476	29,343,766	9.9	
		<i>Total</i>	496657			<i>Average</i>	30,348,133	8.1	
WHEAL VOR, <i>Old</i>	May	7.0	500	128780	5	6	17642	25,848,335	4.0
	June	..	636	177140	..	..	27,099,854	—	Diameter of the cylinder, 46 inches; length of the stroke, 7 feet 8 ins.; working single.
	July	..	706	185910	..	..	26,427,264	3.7	T. Bratt, Engineer.
	August	..	684	160700	..	..	23,578,378	3.5	
	September	..	666	125880	..	..	18,968,645	2.8	
	October	8.6	668	152080	..	..	27,255,063	3.9	Drawing from 110 fathoms below the adit; and discharging therein the water of a 10 inch pump, 5 feet 6 inches stroke, = 18.75 gallons; average 72 gallons per minute.
	November	..	1116	291900	..	..	31,229,586	6.1	
	December	8.4	930	261250	..	19603	31,718,840	6.7	
			<i>Total</i>	5926		<i>Average</i>	26,519,870	3.84	

TABLE II.—Continued.

ENGINES	Mouths.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Length of the stroke, in the pump.	Number of strokes.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL VOR, Velvreach.	January	11.7	1170	158750	5	23131	16,945,289	4,1	Diameter of the cylinder, 45
	February	11.8	1884	266980	3	23892	18,298,762	5.8	inches; length of the stroke, 6 ft. 9 ins.
	March	11.9	1990	242400	..	24246	16,027,380	6.7	; working single.
	April	13.3	1492	348220	..	25051	24,388,131	6.35	T. Bratt, Engineer.
	May	..	892	185230	..	..	26,377,520	5.7	Drawing from 120 fms. below
	June	..	1234	276470	..	..	28,459,046	6.2	the adit; and discharging
	July	..	1052	253370	..	..	30,653,716	5.1	therein the water of a 9 $\frac{1}{2}$
	August	13.4	938	209150	..	25451	28,798,290	4.5	inch pump, 6 ft. 3 ins. stroke,
	September	13.5	835	201250	..	25751	31,881,928	4.4	=17,89 gall.; average 91.46
	October	13.7	772	153430	..	25851	27,464,019	4.0	gallons per minute.
	November	..	1076	201230	..	..	26,941,698	4.3	Pearce's ... 311.45
	December	..	1160	192020	..	..	22,861,826	4.9	Wolff's ... 388.25
<i>Total</i>		14495				<i>Average</i>	24,816,453	5.17	Old ... 72.00
UNITED MINES, Sims's.	January	19.1	6464	312900	7	0	76440	25,901,381	7.0
	February	17.4	4770	286660	..	70003	29,448,515	6.6	
	Mr ch	..	6658	328270	..	..	28,430,398	7.3	
	April	18.2	5858	283140	..	73013	24,703,022	6.75	Diameter of the cylinder, 63
	May	19.1	7008	322070	..	76440	24,590,926	7.2	inches; length of the stroke, 9 feet; working double.
	June	..	5926	305200	..	..	27,557,613	7.1	W. Sims, Engineer.
	July	..	5696	259860	..	..	24,411,146	6.0	Drawing from 144 fms. be-
	August	..	6504	259940	..	..	25,270,475	5.8	low the adit; and discharg-
	September	..	5160	247480	..	..	25,669,100	5.5	ing therein the water of a 16
	October	..	5152	218610	..	..	22,704,549	4.9	inch pump, 7 feet stroke,
	November	19.2	5490	245750	..	76960	24,117,340	5.3	=61.08 gall.; average 338.46
	December	..	5760	286420	..	..	26,835,866	6.86	gallons per minute.
<i>Total</i>		68436				<i>Average</i>	25,832,865	6.36	Total 813.10 gall.

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
UNITED MINES, <i>Stoddart's.</i>	January	22.4	7040	260380	7 6	90820	25,192,874	5.8	
	February	17.0	5280	299430	..	67460	28,692,539	6.9	
	March	..	4160	204100	..	..	24,823,171	4.5	
	April	17.75	5710	280150	..	70078	25,786,801	6.7	
	May	22.4	7376	313930	..	90820	28,990,430	7.0	
	June	22.3	6974	296570	..	88317	28,167,964	6.8	
	July	..	6912	278670	..	..	26,704,967	6.4	
	August	..	7040	269230	..	..	25,331,234	6.0	
	Sept.	..	6880	2866530	..	..	27,585,904	6.4	
	October	..	6944	298060	..	..	28,413,485	6.7	
	Nov.	..	7536	..	..	..	..	..
	December	..	6510	292840	..	..	28,088,011	7.0	
	<i>Total</i>		78362			<i>Average</i>	27,070,643	6.38	
UNITED MINES, <i>Williams's.</i>	January	17.9	5530	258040	6 3	76402	..	5.8	
	February	14.7	4860	326850	..	62586	34,889,524	7.8	
	March	..	4864	3223820	..	..	26,042,383	7.2	
	April	..	4800	—	..	..	..	..
	May	17.9	4760	—	..	76402	..	..
	June	..	4700	—	..	..	..	..
	July	18.5	3264	184930	6 0	83612	28,432,469	8.0	
	August	..	6080	3225680	..	..	26,616,670	7.2	
	September	..	6300	3223620	..	..	25,762,051	—	
	October	..	6860	3255560	..	..	23,465,419	7.3	
	November	..	7030	354770	..	..	25,316,952	7.7	
	December	..	5300	342090	..	..	29,172,408	8.2	
	<i>Total</i>		64248			<i>Average</i>	27,482,283	7.4	

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.	
									Feet. In.	W. Sims, Engineer.
UNITED MINES, Polderry.	January	18,0	4224	249080	7 9	71360	32,611,553	5,58	Diameter of the cylinder, 63 inches; length of the stroke, 9 ft. 10 ins.; working single.	
	February	..	3480	207000	..	..	32,896,344	4,8	W. Sims, Engineer.	
	March	..	4860	279130	..	..	32,160,428	6,2	Drawing from 131 fathoms below the adit; and discharging therein the water of a 16 inch pump, 7 feet 9 inches stroke, =67,63 galls.; average 355.73 galls. per minute.	
	April	..	4110,	240730	..	..	32,392,534	5,75	Sims's.....388.46	
	May	..	4544	255680	..	..	31,118,236	5,0	Stoddart's.....389.69	
	June	..	4000	237140	..	..	32,796,975	5,5	Williams's.....349.54	
	July	..	4064	206620	..	..	28,117,424	4.77	Forderay.....355.73	
	August	..	4052	202310	..	..	27,680,661	4.5	Total 1474.32 galls. per minute from United Mines.	
	September	..	4010	213050	..	..	29,382,835	4.77	Average 30,785,499	
	October	..	4320	225950	..	..	28,925,784	5,0	5,26	
	November	..	4250	236640	..	..	30,793,267	5,1	6,7	
	December	..	4920	271870	..	..	30,539,956	6,2	7,2	
	Total	50834	..	..	..	..	..	..	Diameter of the cylinder, 52 inches; length of the stroke, 6 ft. 8 ins.; working single.	
WHEAL UNITY WOOD.	January	9,0	1540	272280	5 9	22480	22,853,839	6,7	R. Michell, Engineer.	
	February	..	1470	384150	..	..	29,362,468	7,2	Drawing from 90 fathoms below the adit; and discharging therein the water of a 10 $\frac{1}{4}$ inch pump, 5 feet 9 inches stroke, =22,6 galls.; average 163.62 gallons per minute.	
	March	7,0	1220	325750	..	17250	26,483,875	7.8	22,215,738	
	April	..	1250	341600	..	..	27,105,960	7,9	29,262,394	
	May	..	1262	340640	..	..	23,628,946	7,2	26,380,103	
	June	8,3	1472	305700	..	20488	24,477,694	6,8	27,259,644	
	July	8,7	1570	316990	..	21490	24,948,829	6,3	7,1	
	August	..	1310	264500	..	..	22,215,738	6,5	6,7	
	September	8,9	1200	271540	..	22490	29,262,394	6,7	7,1	
	October	..	1552	316600	..	..	26,380,103	6,86	6,86	
	November	..	1408	296910	..	..	18331	9,9	9,9	
	December	7,4	1550	485460	..	..	..	..	Average 25,819,044	
	Total	16804	..	..	..	..	..	..	7,24	

TABLE II.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps. Frs. fms.	Load in pounds. Frs. fms.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.	
									—	—
WHEAL UNITY. <i>West.</i>	January	11,1	2700	—	5 6	30650	—	—	Diameter of the cylinder, 58 inches; length of the stroke, 7 ft. 6 ins.; working double.	
	February	..	2850	—	..	..	22,353,624	7,1	A. Woolf, Engineer.	
	March	..	2750	—	..	..	23,395,347	7,0	Drawing from 79 fathoms below the adit; and discharging therein the water of a 16 inch pump, 5 feet 9 inches stroke, =43,19 gallons; average, 260 gallons per minute.	
	April	10,5	2832	307600	5 9	37419	25,202,670	6,2	Drawing from 79 fathoms below the adit; and discharging therein the water of a 16 inch pump, 5 feet 9 inches stroke, =43,19 gallons; average, 260 gallons per minute.	
	May	..	2672	290540	..	..	24,704,093	6,0	A. Woolf, Engineer.	
	June	10,7	2512	277730	6 0	37992	26,252,472	5,1	Drawing from 79 fathoms below the adit; and discharging therein the water of a 16 inch pump, 5 feet 9 inches stroke, =43,19 gallons; average, 260 gallons per minute.	
	July	..	2780	301280	..	..	25,315,196	5,0	A. Woolf, Engineer.	
	August	..	1800	207300	..	..	25,183,982	5,2	Drawing from 79 fathoms below the adit; and discharging therein the water of a 16 inch pump, 5 feet 9 inches stroke, =43,19 gallons; average, 260 gallons per minute.	
	September	..	1820	202120	..	..	23,987,057	5,2	A. Woolf, Engineer.	
	October	..	2128	235100	..	..	32,880,486	7,4	Drawing from 79 fathoms below the adit; and discharging therein the water of a 16 inch pump, 5 feet 9 inches stroke, =43,19 gallons; average, 260 gallons per minute.	
	November	..	2144	225610	..	..	—	—	A. Woolf, Engineer.	
	December	..	2510	362050	..	..	—	—	Drawing from 79 fathoms below the adit; and discharging therein the water of a 16 inch pump, 5 feet 9 inches stroke, =43,19 gallons; average, 260 gallons per minute.	
		<i>Total</i>		29498	—	—	25,473,880	6,02	A. Woolf, Engineer.	
WHEAL UNITY, <i>Tadpole.</i>	January	10,3	3824	319570	6 3	50564	28,597,503	7,9	Diameter of the cylinder, 60 inches; length of the stroke, 10 feet; working single.	
	February	..	3608	268750	..	..	23,539,833	6,0	A. Woolf, Engineer.	
	March	..	4704	344000	..	..	23,100,671	8,0	Drawing from 84 fathoms below the adit; and discharging therein the water of a 16 inch pump, 6 feet 3 inches stroke, =54,54 gallons; average, 310,87 gallons per minute.	
	April	..	3850	324800	..	..	26,661,018	7,2	A. Woolf, Engineer.	
	May	..	3830	305050	..	..	25,170,607	6,6	Drawing from 84 fathoms below the adit; and discharging therein the water of a 16 inch pump, 6 feet 3 inches stroke, =54,54 gallons; average, 310,87 gallons per minute.	
	June	..	3434	220600	..	..	20,301,431	5,1	A. Woolf, Engineer.	
	July	..	3500	—	..	..	—	—	Drawing from 84 fathoms below the adit; and discharging therein the water of a 16 inch pump, 6 feet 3 inches stroke, =54,54 gallons; average, 310,87 gallons per minute.	
	August	..	3492	2322800	..	..	21,068,333	5,7	A. Woolf, Engineer.	
	September	..	3568	246000	..	..	21,788,719	5,1	Drawing from 84 fathoms below the adit; and discharging therein the water of a 16 inch pump, 6 feet 3 inches stroke, =54,54 gallons; average, 310,87 gallons per minute.	
	October	..	3280	181760	..	..	17,512,409	4,2	A. Woolf, Engineer.	
	November	9,9	2750	251540	..	44802	—	3,0	Drawing from 84 fathoms below the adit; and discharging therein the water of a 16 inch pump, 6 feet 3 inches stroke, =54,54 gallons; average, 310,87 gallons per minute.	
	December	..	3210	158410	..	..	—	—	A. Woolf, Engineer.	
		<i>Total</i>		43050	—	—	23,082,280	5,7	A. Woolf, Engineer.	

In 1822, there were 52 engines reported, average duty 28,9 millions. Although the average did not much exceed that of the preceding year, yet considerable change was taking place. Many mines replaced their machinery by new and improved engines; and considerable excitement and emulation appeared among the engineers. Several young men showed that they possessed great abilities; and within a few years from this time the improvement began to be very evident.

Among the engines reported, we may notice the following:

	Millions.	
Dolcoath engine, erected .. by Jeffree and Gribble	44,1	
Maria, at Consols	by Woolf	40,6
Tincroft	by Jeffree and Gribble	38,7
Treskirby	by Sims	37,0
Wheal Rose	by Sims	36,7
Wheal Fortune, at Consols by Woolf	35,5	

In 1823, 52 engines reported, average duty 28,2

In 1824, 49 engines reported, average duty 28,3

The best engines in these two years were Gribble's at Dlocoath, Woolf's at Consols & Wheal Busy, Sims and Richard's at Wheal Vor, and Sims's at Polgooth and Poldice: and although they rarely exceeded 40 millions, yet Sims's at Polgooth approached 47 millions.

In 1825, 56 engines reported averaged duty 32 millions. A general improvement was now observable.

The following deserve notice:

	Millions.	
Polgooth engine	by Sims	54,0
Wheal Vor	by Sims and Richards ..	45,5
Wheal Sparnon	by Woolf	44,1
Wheal Hope	by Grose	43,4
Wheal Alfred	by Woolf	41,9
Herland	by Webb	40,5

The engine at Wheal Hope was the first erected by Capt. Samuel Grose; and the experiments which he was, by the means of it, enabled to make on the generation and preservation of heat, led to those great improvements which he afterwards exhibited at Wheal Towan: and which began, as it were, a new era in the duty of the steam engine.

In 1826, the number reported was 51; average duty 30,5 millions.

The following deserve notice:

	Millions.
Herland engine	by Webb
Wheal Vor	by Sims and Richards
Pembroke	by Sims
Wheal Hope	by Grose
Consols	by Woolf

In 1827, 51 engines reported; average duty 32,1

Although the general average at this time was less than what the performance of some particular engines might lead us to expect, yet this must be considered an important epoch in our history. An engine 80-inch cylinder, erected by Capt. Samuel Grose at Wheal Towan, in which he has adopted those improvements which he had discovered by his experiments at Wheal Hope, (alluded to above,) far surpassed all others for the first nine months of the year; from April to September it maintained a duty of more than 60 millions; and, in July, reached 62,2 millions. In October, Woolf's engine, 90-inch cylinder, then newly erected at the Consolidated Mines, went beyond this; and in the following month, performed the hitherto unprecedented duty of 67 millions.

This great and rapid increase in the effect produced by given quantities of fuel, created doubts in the minds

of many, which led to a public trial ; the second that had been made to verify the correctness of the Monthly Reports. This took place at the Consolidated Mines, on Woolf's engine, in the presence of some of the principal mine agents and engineers ; who expressed their conviction of the accuracy of the Reports, by a statement in the public papers, dated December 19th, 1827. They found the duty of the engine, during the time of their investigation, to be 63,663,473.

The following is a copy of their report :

Consolidated Mines, December 19th, 1827.

The extraordinary duty performed by Wheal Fortune engine in these mines, having excited a doubt in some quarters whether the duty was correctly stated in the monthly reports of engines.

We the undersigned have been requested to investigate the fact, and the following statement shews the result of an experiment we have made for the purpose.

5 lifts 150 fathoms 14-inch plunger } load 62691 lbs.
1 ditto 12½ fathoms bucket }
length of stroke 7 feet 5 inches ;—the engine worked 26

hours and 30 minutes—strokes per minute 5,51—number of strokes 8763—coals consumed 64 bushels—duty performed 63,663,473 lbs., lifted one foot high by consuming a bushel of coals.

We have to offer our acknowledgements for the very handsome manner in which the engine was surrendered entirely to our controul by Capt. William Francis and Mr. Woolf, and for the facilities they afforded us in the course of the experiment ; and we recommend that the result so creditable to the Engineer, and so important

to the mining interest, should have all the publicity it is so deservedly entitled to.

(Signed) Sims and Son, Engineers.
 Nicholas Vivian, }
 Charles Beater, } Mine Agents.
 Mark James, }
 Thomas Bickle, }
 Edward Roberts, } Deputy Engineers.
 James Berryman, }
 Richard Mollard, } Pitmen.
 Richard Ham, }

The Engine on which the above experiment was tried, is of 90 inch cylinder, worked by two round boilers with fire in the tubes, and loaded between 7 and 8 lbs. per square inch on the piston.

In this year we notice the following : Millions.
 Consolidated Mines engine by Woolf.....63,7
 Wheal Towanby Grose60,0
 Wheal Hopeby Grose55,0
 Wheal Vorby Sims and Richards..45,5
 Ting-Tang.....by Sims41,7
 Wheal Fortune at Consols by Woolf40,8

In 1828, the number of engines reported was 57, the average duty 37 millions.

Public attention had now been attracted to the improvements which Capt. Grose had introduced into his engine at Wheal Towan ; and which had been brought to a degree of perfection, surpassing the expectations of the most sanguine. The duty of this engine, in the month of April this year, equalled 87 millions : and the average for the whole year was 77,3 millions.

This again gave rise to suspicions of error in the Reports ; and a third experiment was determined on, to

verify their correctness. The engine was accordingly subjected to a trial, (as Stray Park engine had been in 1815, and that at the Consolidated Mines in 1827;) which was superintended and conducted by many of the principal mine agents, engineers, and pitmen, of other mines, who met for the purpose and certified their conviction of the truth of the statements of the duty which had been reported, by the following document.

On the 6th and 7th instant an experiment was made at Wheal Towan, in St. Agnes, at the request of Capt. William Francis, for ascertaining the duty of the Steam Engines erected thereon by Mr. Samuel Grose, when we, the undersigned were present. Wilson's engine was selected and placed under our entire management.

The trial was made in the following manner.—At half-past nine in the morning, the weight was adjusted on the safety-valve, to a pressure of about 40 lbs. per square inch above the pressure of the atmosphere. This allowed the escape of the steam. There was no guage to ascertain its elastic force in any other way; part of the fire was then taken out, and the engine worked with the remainder for about two hours, when the steam ceased to issue from the valve. The quantity of water in the three boilers separately was then estimated by means of swimmers—pieces of granite so adjusted as to remain on its surface. The mine agents then went underground, and measured the respective diameters and depths of the lifts.

At the termination, the quantity of water in the boilers was estimated in the manner before mentioned, and the weight being adjusted on the safety-valve, as at the commencement, the engine was worked until the steam ceased to issue from it.

Fifty-four bushels of coal, were burnt, the consumption of which occupied twenty-six hours. The load in the shaft was 58564 lbs., the length of the stroke in the shaft 8 feet, the number of strokes 10052 making the average number of pounds lifted one foot high, by each bushel of coal 87,209,662.

We think the greatest credit is due to Captain Grose for the talents he has displayed, both in the construction of his engine, and in his subsequent attention to, and management of, it.

Signed by

William Francis,	W. J. Henwood,
W. Sims,	James Eddy,
Andrew Vivian,	Edward Roberts,
Thomas Richards,	James Roach,
Josiah Harvey,	Richard Mollard,
Thomas Teague,	James Berryman,
William Richards,	James Noble,
James Sims,	John Ham,
John Richards,	James Trezona,
Joseph Vivian,	Benjamin Wearn,
Frederick Parker,	

} Pitmen.

Wheal Towan, May 7th, 1828.

The principles which had been introduced by Captain Grose into Wheal Towan engine, having been applied with various modifications in many instances to other engines, the advantage was rendered obvious by the advance of the average duty of the whole. We select the following as specimens of the best engines :

	Millions.
Wheal Towan engine. by Grose	87,0
Wheal Hope by Grose	74,8
Consols by Woolf	67,6

		Millions.
Binner Downs	by Gregor and Thomas..	63,5
Consols	by Woolf.....	61,7
Consols	by Woolf.....	61,3
Wheal Vor.....	by Sims and Richards..	61,1
Wheal Towan, (Druce's)	by Grose.....	59,4
Consols	by Woolf	58,4
Poldice	by Sims.	57,8
Wheal Vor.....	by Sims and Richards..	51,9

Other engines will be found in the following table nearly equal to some of these.

TABLE III.—Shewing the work performed by the pumping engines reported in 1828.

ENGINES.	Mouths.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes, per minute.	REMARKS.
WHEAL ALFRED, <i>Woolf's.</i>	January	13.96	4464	341040	7	71658	41,058,808	7,2	
	February	14.0	4176	334780	6	71964	43,268,871	7,0	
	March	..	3276	228080	..	72373	37,450,707	6,28	
	April	..	3646	286170	..	..	43,804,952	6,8	
	May	..	3042	230700	..	..	41,164,820	5,7	Diameter of the cylinder, 70 inches; length of the stroke, 10 feet; working single. Woolf, Engineer.
	June	..	3240	245280	..	72680	41,286,088	5,5	
	July	14.5	3334	233540	..	74669	39,228,100	5,1	
	August	14.6	3348	220100	..	74975	36,986,240	5,1	
	September	..	3528	235680	..	75180	37,683,517	5,43	
	October	..	3510	223130	..	75681	36,087,463	5,0	
	November	..	3078	212680	..	75895	39,330,771	4,8	
	December	..	3294	247630	..	..	42,791,163	4,9	
		<i>Total</i>	41836			<i>Average</i>	39,881,842	5,73	
WHEAL ALFRED, <i>Middle.</i>	January	8.1	1422	252970	6	0	23006	24,556,235	5,8
	February	8.2	1514	272860	..	..	23447	25,354,353	5,7
	March	..	1368	217390	..	..	24036	22,917,482	6,0
	April	10.2	1430	228760	6	9	24772	26,749,082	5,48
	May	..	1350	224460	..	..	27,801,615	5,5	
	June	..	1422	253600	..	..	29,820,470	5,68	
	July	..	1512	281170	..	..	31,094,389	6,1	
	August	12.1	1350	218200	..	..	31,912,841	5,0	
	September	..	1440	—	..	..	32,000,000	—	
	October	..	1682	211280	..	..	30134	25,398,116	4,7
	November	12.4	1440	216990	..	..	31460	31,999,244	4,8
	December	..	1548	224980	..	..	30,862,808	4,66	
		<i>Total</i>	17488			<i>Average</i>	28,372,303	5,4	

TABLE III.—Continued.

ENGINES.	Mouths.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a ton of coal.	Number of strokes per minute.	REMARKS.
WHEAL ALFRED, <i>Taylor's.</i>	January	6,5	3204	321980	7	6	55524	41,849,356	6,75
	February	..	2940	303900	..	..	55822	43,745,507	6,5
	March	..	2322	232350	..	..	55769	41,853,769	6,44
	April	..	2632	247970	..	..	55990	39,562,614	5,9
	May	..	2340	238320	..	..	42,767,746	5,9	Diameter of the cylinder, 90 inches; length of the stroke 10 feet; working single.
	June	6,48	2556	280420	..	..	54943	41,984,319	5,8
	July	..	22214	257430	..	..	..	47,913,190	5,9
	August	..	2106	215040	..	..	..	42,076,006	4,97
	September	..	1982	198550	..	..	..	41,973,847	4,63
	October	..	1998	192250	..	..	55213	39,844,987	4,3
	November	..	1782	183070	..	..	55274	42,583,430	4,1
	December	..	2034	193580	..	..	55474	38,593,817	3,83
	Total	28090	..	..	..	..	Average	42,144,303	
WHEAL BEAUCHAMP, <i>Western.</i>	January	14,8	1172	236310	6	0	19777	23,594,077	5,65
	February	15,2	1376	245680	..	..	19830	21,892,835	4,37
	March	14,4	1008	201680	..	..	17493	22,706,296	5,0
	April	..	1152	213590	..	..	..	21,041,210	4,84
	May	..	1210	238450	..	..	..	..	5,0
	July	12,0	584	181710	..	..	15762	30,469,287	4,0
	August	12,3	600	190590	..	..	16167	30,765,801	3,89
	September	..	480	158310	..	..	..	33,393,449	3,9
	October	12,8	467	173380	..	..	16682	37,169,494	3,65
	November	11,6	372	133750	..	..	15173	32,732,076	4,2
	December	..	830	267120	..	..	..	28,293,880	4,4
	Total	44276	..	..	..	..	Average	28,229,431	4,76

TABLE III.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumpa. Feet. <i>fms.</i>	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
BALNOON.	January	5.95	282	1683800	7 0	4911	20,136,882	3.77	Diameter of the cylinder, 30 inches; length of the stroke, 8 ft. 6 ins.; working single. Eustis and Son, Engineers.
	February	..	313	189730	..	..	20,397,408	3.85	
	March	5.17	215	127340	..	4388	17,320,609	3.14	
	April	5.29	239	143470	..	4687	18,953,841	3.1	
	May	5.35	200	124350	..	4938	19,750,510	3.07	
	June	..	266	162640	..	..	19,422,640	3.29	
	July	5.13	199	114120	..	4645	16,639,154	2.9	
	August	4.6	229	141200	..	4151	16,189,905	2.97	
	September	5.0	196	120610	..	4557	17,674,390	3.3	
	October	5.88	221	134800	..	4893	18,865,900	3.0	
	November	..	274	169780	..	..	19,163,054	3.19	
	December	6.0	292	213840	..	5244	23,992,154	4.6	
	Total		2926			Average	19,042,204	3.34	
BINNER DOWNS. <i>Swan's.</i>	January	10.15	2753	352700	7 5	52095	50,056,047	9.0	
	February	..	3139	439400	..	..	54,692,250	8.7	
	March	..	2320	201030	..	..	59,503,737	8.7	
	April	5.37	1287	325170	..	27584	52,231,852	7.5	
	May	10.93	2297	156900	..	58095	61,323,544	8.5	
	June	..	2340	—	..	..	—	—
	July	..	2511	370510	..	..	62,078,131	8.0	
	August	..	2084	314450	..	..	63,480,348	8.4	
	September	..	2509	373400	..	..	62,612,215	7.87	
	October	..	2303	341850	..	..	62,449,228	7.64	
	November	..	2006	294330	..	..	61,728,968	7.57	
	December	..	2462	360300	..	..	61,568,933	7.8	
	Total		28011			Average	59,247,750	8.16	

TABLE III.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Feet. Fms.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
BINNER DOWNS, <i>Old</i> .	January	8,0	2913	397160	7	30826	30,862,624	10.2		
	February	..	3452	512800	5	..	33,626,763	10.17		
	March	..	2685	217480	..	49162	33,151,311	9.43		
	April	13,54	5020	433490	..	30826	32,832,760	10.0		
	May	8,0	4180	174890	..	..	33,549,867	9.3		
	June	..	2453	—	..	..	—	—
	July	..	2628	422970	..	..	36,428,956	9.18		
	August	..	2320	318900	..	..	34,042,451	9.32		
	September	7,87	2606	430230	..	29452	36,467,192	9.0		
	October	..	2413	—	..	..	—	—
	November	..	1988	345000	..	..	38,333,526	8.87		
	December	..	2661	422720	..	..	35,090,049	9.17		
	<i>Total</i>	<i>36319</i>					<i>Average</i>	<i>34,438,550</i>	<i>9.46</i>	
BINNER DOWNS, <i>Gregor's.</i>	January	11,0	1521	373320	7	6	18309	33,703,727	9.6	
	February	11,1	1608	412140	..	18615	35,783,517	8.17		
	March	11,8	965	303900	..	19617	46,333,727	7.5		
	April	..	1093	302690	..	..	40,744,760	7.0		
	May	..	1075	340070	..	..	46,542,929	7.16		
	June	..	930	—	..	..	—	—
	July	..	1003	321450	..	..	47,152,876	7.0		
	August	..	692	264330	..	..	56,199,728	7.0		
	September	..	1093	331930	..	..	44,680,723	6.98		
	October	..	1042	322470	..	..	45,531,886	7.2		
	November	..	806	248260	..	..	46,317,460	6.38		
	December	..	996	319360	..	..	47,175,339	6.9		
	<i>Total</i>	<i>12824</i>					<i>Average</i>	<i>44,467,859</i>	<i>7.36</i>	
										Total 922,66 galls. per minute from Binner Downs Mine.

TABLE III.—Continued.

ENGINES.	MOTHS.	Loud per square inch, on the piston.	Consump- tion of coal, in bushels.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by con- suming a bushel of coal.	Number of strokes per minute.	REMARKS.
				Feet.	In.			
WHEAL BUSY.	January	11.4	3384	431740	7 6	58732	44,483,762	9.1
	February	..	4050	346280	..	..	47,451,105	8.65
	March	..	3712	365620	..	..	43,386,841	8.46
	April	..	3152	300610	..	..	42,010,056	7.73
	May	..	3728	383300	..	..	45,289,650	7.6
	June	..	2506	—	..	..	—	—
	July	..	2592	299160	..	..	50,839,887	7.1
	August	..	2624	308620	..	..	51,807,935	6.49
	September	..	2432	268440	..	..	48,620,522	6.43
	October	..	2368	244680	..	..	45,614,819	6.0
	November	..	2352	247060	..	..	46,270,178	6.13
	December	11.5	3684	400920	..	59346	48,702,096	6.63
	Total	36564	—	—	—	Average	46,762,258	7.3
CONSOLIDATED NINES, <i>Job's</i>	January	6.9	2904	300110	7 6	50086	38,820,530	7.44
	February	..	3141	400250	..	..	47,867,529	7.94
	March	..	2234	323760	..	..	54,439,939	7.75
	April	..	1846	280561	..	..	57,091,528	7.2
	May	..	2646	398490	..	..	56,572,477	8.14
	June	..	1846	—	..	68904	53,739,472	—
	July	8.12	2745	285450	..	..	58,103,807	6.4
	August	..	2436	273890	..	..	59,979,106	5.94
	September	..	2144	251800	..	..	58,529,616	5.83
	October	8.82	5482	2538970	..	74794	64,766,922	5.44
	November	..	1520	148500	..	..	61,266,050	4.7
	December	..	2870	313470	..	..	51.18	—
	Total	28814	—	—	—	Average	55,564,270	6.57

TABLE III.—Continued.

F. N. G. I. N. E. S.	Months.	Load per square inch on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
CONSOLIDATED MINE S., <i>Taylor's</i> .	January	7,85	1808	251960	7 6	40749	42,590,367	6,25	Diameter of the cylinder, 70 inches; length of the stroke, 10 feet; working single. Woolf, Engineer.
	February	8,0	2510	349840	..	41238	43,107,675	6,94	
	March	..	2044	279210	..	..	42,248,270	6,68
	April	..	1783	245430	..	..	42,573,088	6,3
	May	..	2544	347820	..	..	42,285,970	7,1
	June	..	1840	..	..	..	..	..
	July	..	2709	343690	..	..	39,238,893	7,7
	August	..	2163	331210	..	..	47,359,354	7,2
	September	..	1792	298860	..	..	51,580,867	6,9
	October	8,3	1670	268440	..	42650	51,417,511	5,65	
	November	9,1	967	153520	..	46642	55,536,296	4,84	
	December	9,29	1985	324410	..	47654	58,410,962	5,36	
<i>Total</i>		17.7	23815	..	6 6	<i>Average</i>	46,935,386	6,44	
CONSOLIDATED MINE S., <i>Pearce's</i> .	January	2216	250630	56558	41,583,656	6,2	Diameter of the cylinder, 58 inches; length of the stroke, 7 feet 9 ins.; working single. Woolf, Engineer.
	February	..	3032	338680	..	..	40,822,116	6,68
	March	..	2160	230740	..	..	39,271,413	5,5
	April	..	1808	188430	..	..	38,314,134	5,0
	May	..	2112	..	..	..	..	..
	June	..	1870	..	..	..	..	..
	July	..	1808	188350	..	..	37,952,201	4,18
	August	..	1780	169500	..	..	35,007,177	3,68
	September	..	1974	185190	..	..	34,488,776	4,28
	October	..	2548	269110	..	..	38,827,355	5,66
	November	..	1888	203000	..	..	39,527,691	6'88
	December	18,3	3515	387700	..	57722	41,383,307	6,4	
<i>Total</i>		26711	<i>Average</i>	38,717,183	5,44	

TABLE III.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumpa.	Load, in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
CONSOLIDATED MINES, <i>Woolf's.</i>	January	7.4	1272	160270	7 6	62725	59,274,385	3.97	
	February	..	1557	208270	..	..	62,927,436	4.13	
	March	7.68	1318	168240	..	65135	62,357,619	4.0	Diameter of the cylinder, 90 inches; length of the stroke, 10 feet; working single.
	April	7.7	1256	146340	..	65528	57,261,350	3.76	
	May	..	1728	237530	..	..	67,555,841	4.85	
	June	..	1670	—	..	..	—	—	Woolf, Engineer.
	July	7.75	1728	228710	..	65920	65,436,472	5.1	
	August	7.83	1792	222890	..	66444	61,982,574	4.84	Drawing from 173 fms. below the adit; and discharging therein the water of a 14 inch pump, 7 feet 6 inches stroke, = 50.1 galls.; average 237.47 gallons per minute.
	September	..	1724	217560	..	..	62,986,702	5.0	
	October	..	1734	228720	..	..	65,731,278	4.8	
	November	..	1670	203780	..	..	60,808,196	6.88	
	December	..	2340	295930	..	..	63,021,708	4.9	
	<i>Total</i>	<i>19789</i>				<i>Average</i>	<i>62,658,505</i>	<i>4.74</i>	
CONSOLIDATED MINES, <i>Bawden's.</i>	January	10.88	3830	187670	7 6	85568	—	—	4.65
	February	..	4788	—	..	..	—	—
	March	10.8	3384	230170	..	85394	43,561,917	5.5	
	April	..	3450	210140	..	..	39,010,206	5.6	Diameter of the cylinder, 90 inches; length of the stroke, 10 feet; working single.
	May	..	4068	219220	..	..	34,513,408	4.54	
	June	..	3810	—	..	..	—	—	Woolf, Engineer.
	July	10.6	3946	183640	..	89291	31,165,862	4.1	
	August	..	3906	200720	..	..	34,413,382	4.35	Drawing from 178 fms. below the adit; and discharging therein the water of a 16 inch pump, 7 feet 6 inches stroke, = 65.45 galls.; average 297.14 galls. per minute.
	September	..	3591	169600	..	..	31,628,568	3.93	
	October	..	3985	174000	..	..	29,240,841	3.7	
	November	..	1003	—	..	..	—	—
	December	..	3741	—	..	..	—	—
	<i>Total</i>	<i>43592</i>				<i>Average</i>	<i>34,790,593</i>	<i>4.54</i>	

TABLE III.—Continued.

ENGINES.	Month.	Load per square inch on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bucket of coal.	Number of strokes per minute.	REMARKS.
CONSOLIDATED MINE S., Shear's.	January	8.39	1624	165040	7	43036	32,801,700	4.1	Diameter of the cylinder, 70 inches; length of the stroke, 10 feet; working single. Woolf, Engineer. Drawing from 146 fathoms below the adit; and discharging therein the water of a 13 inch pump, 7 ft. 6 ins. stroke, =43.2 galls.; average 203.9 gallons per minute.
	February	..	2352	257270	..	..	35,305,713	5.1
	March	..	1453	207280	..	..	46,045,261	4.96
	April	8.54	1188	185780	..	43854	51,434,318	4.77	
	May	..	1404	240940	..	..	56,443,283	4.92
	June	..	1146	220260	..	..	—	—
	July	8.66	1268	1054	177720	45082	57,932,896	4.9	
	August	8.8	1440	223540	..	..	52,487,657	5.17
	Sept.	..	1247	223020	..	..	60,470,264	4.7
	October	..	848	148380	..	..	59,162,160	4.7
	Nov.	..	1579	288140	..	..	61,700,098	4.76
	December	..	Total	16603	..	Average	51,891,029	4.72	Total 1983,3 million per minute from the Consolidated Mines.
C A R D R E W D O W N S.	January	13.17	1728	517960	5	9	9938	17,128,499	10.5
	February	14.5	1998	569700	10938	17,983,146	11.6
	March	..	1782	558520	19,712,277	13.38	Diameter of the cylinder, 27 inches; length of the stroke 7 ft. 7 ins.; working double. Sims and Son, Engineers.
	April	..	1780	—	..	..	—	—
	May	..	2553	—	..	..	—	—
	June	..	1656	—	..	..	—	—
	July	22.3	1782	396630	..	16807	21,509,776	9.5	
	August	22.4	1800	422250	..	17128	23,103,174	8.6	
	September	..	1296	302070	..	..	22,954,989	8.0
	October	22.8	2070	410840	..	17240	19,865,093	7.7	
	November	24.7	1080	246510	..	18565	24,365,402	7.78	
	December	..	2178	47140	..	..	23,395,720	9.74
	Total	21706	Total	21706	..	Average	21,064,230	9.64	

TABLE III.—Continued.

ENGINES	Mouths.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL CHANCE, Sims's.	January	1,81	1854	194730	6 0	36580	23,052,502	3,97	
	February	..	1926	194510	..	..	21,651,628	4,1	Diameter of the cylinder, 45 inches; length of the stroke, 7 ft. 11 ins.; working single.
	March	..	1728	197270	..	..	25,056,029	4,7	
	April	..	1998	202270	..	..	22,219,329	5,0	
	May	..	2520	248910	..	..	21,678,876	4,94	Sims and Son, Engineers.
	June	..	1710	186940	..	..	25,258,169	4,9	
	July	..	1692	194220	..	..	25,193,502	4,68	Drawing from 98 fms, below the adit; and discharging therein the water of a 14 inch pump, 6 feet stroke, =40,08 galls; average 179,96 gallons per minute.
	August	..	1764	223500	..	..	27,808,265	4,56	
	September	20,16	1404	165300	..	40790	28,814,474	4,25	
	October	..	1962	239910	..	..	28,678,987	4,3	
	November	..	1026	131210	..	..	31,298,572	4,14	
	December	..	1728	217270	..	..	30,772,372	4,4	
		<i>Total</i>	21312				<i>Average</i>	25,956,892	4,49
CARZISE	January	6,65	718	238370	7 0	17045	39,611,582	6,1	
	February	6,9	1092	309580	..	17503	34,734,479	6,14	
	March	7,34	736	294480	..	17800	49,021,717	7,3	Diameter of the cylinder, 50 inches; length of the stroke, 9 feet; working single.
	April	..	762	223440	..	..	35,926,630	5,54	
	May	..	822	249260	..	..	34,237,202	5,24	
	June	..	742	227730	..	..		—
	July	..	742	181980	..	..	37,603,379	4,94	
	August	..	674	195000	..	..	33,080,670	4,68	
	September	..	790	188400	..	..	30,242,525	4,23	
	October	..	718	155570	..	..	32,148,964	4,3	
	November	..	674	160000	..	..	28,279,810	4,15	
	December	..	872	9412	..	..	22,480,917	3,17	
		<i>Total</i>	9412				<i>Average</i>	34,306,170	5,1

TABLE III.—Continued.

ENGINES.	Months.	Loud per square inch on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.	
WHEAL CAROLINE.	January	21.85	1750	4633860	6 0	18090	<u>19,975,136</u>	11.9	Diameter of the cylinder, 30 inches; length of the stroke, 7 feet; working single. Wolf, Engineer.	
	February	..	2084	—	..	..	<u>30,298,321</u>	11.6
	March	..	598	166370	..	19700	<u>30,302,052</u>	10.59		
	April	23.9	1666	427100	..	19980	<u>29,695,105</u>	9.9		
	May	24.26	1902	470950	..	..	—	—
	June	..	1630	—	..	..	—	—
	July	25.85	1481	391040	..	21298	<u>33,740,863</u>	9.3		
	August	26.0	1567	451870	..	21474	<u>37,154,268</u>	11.62		
	September	..	2162	574390	..	..	<u>34,230,668</u>	11.0
	October	27.9	1729	443600	..	<u>22969</u>	<u>35,358,178</u>	10.6		
	November	28.0	1424	376970	..	23082	<u>36,678,333</u>	10.0		
	December	..	1994	527550	..	..	<u>36,656,523</u>	9.9
	Total	19065	—	—	—	<u>Average</u>	<u>32,404,944</u>	10.63		
CRINNIS CONSOLS, Rowe's.	January }	16.66	—	—	7 0	<u>43336</u>	—	—	Diameter of the cylinder, 53 inches; length of the stroke, 8 ft. 3 in.; working single. Gross, Engineer.	
	Feby. }	..	7072	292500	..	..	—	—
	March	..	240100	..	..	..	—	—
	April	14.17	1976	231110	..	<u>36677</u>	<u>30,027,808</u>	5.28		
	May	16.7	2340	223000	..	<u>43448</u>	<u>28,983,900</u>	5.7		
	June	..	1648	178000	..	..	<u>32,849,640</u>	4.8
	July	13.55	1828	230400	..	<u>35247</u>	<u>31,097,571</u>	4.57		
	August	12.2	1328	226380	..	31810	<u>37,957,857</u>	5.06		
	September	11.5	1378	210300	..	<u>29952</u>	<u>31,997,343</u>	5.0		
	October	11.68	1460	191300	..	30420	<u>27,900,973</u>	4.4		
	November	..	1236	162610	..	..	<u>28,014,703</u>	4.5
	December	..	1236	—	..	..	—	—
	Total	21502	—	—	—	<u>Average</u>	<u>31,103,724</u>	5.03		

TABLE III.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes, per minute.	REMARKS.
CRINNES CONSOLES, Walker's.	January	6.7	1310	268250	6 9	16567	22,898,967	6.4	Diameter of the cylinder, 5 $\frac{1}{2}$ inches; length of the stroke, 6 ft. 9 ins.; working single.
	February	7.2	1318	246860	..	18039	22,507,802	5.66	
	March	8.48	1352	237310	..	21247	24,779,198	5.1	
	April	9.5	1296	202360	..	23812	24,749,293	5.0	
	May	9.6	1414	226000	..	24112	25,619,553	4.9	
	June	9.9	980	186680	..	24810	31,331,809	4.45	
	July	..	1272	2290850	..	..	28,557,754	4.37	
	August	..	1164	182500	..	..	25,738,355	4.06	
	September	..	1174	159030	..	..	22,280,489	3.79	
	October	..	1200	..	..	..	..	—
	November	10.28	1256	143200	..	25653	33,060,145	5.3	
	December	10.0	1144	257300	..	24381	31,606,572	5.09	
	Total	14880	..	..	Average	26,632,721	4.92		
WHEAL DAMSEL, Skewes's.	January	21.5	1412	221150	5 9	38976	35,100,827	5.68	
	February	..	1784	286510	..	..	35,992,336	5.68	
	March	..	1500	222690	..	..	33,258,220	5.52	
	April	..	1628	227030	..	..	31,253,161	5.25	
	May	..	1722	2677540	..	..	33,836,864	5.6	
	June	..	1368	..	..	..	..	—
	July	..	1520	251600	..	..	37,096,433	5.6	
	August	..	1812	296380	..	..	36,731,115	6.0	
	September	..	1406	246350	..	..	39,108,022	5.68	
	October	..	1832	271990	..	..	33,640,043	5.78	
	November	..	1285	..	..	..	..	—
	December	..	2426	375890	..	..	34,724,426	6.2	
	Total	19745	..	..	Average	35,074,144	5.7		

TABLE III.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by coal, burning a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL DAMSEL, <i>Stephens's.</i>	January	9,94	572	117020	6	25526	33,943,778	3,0	Diameter of the cylinder, 50 inches; length of the stroke 8 ft. 6 ins.; working single.
	February	10,0	766	156300	6	25673	32,611,448	3,1	Sims and Son, Engineers.
	March	10,1	563	118800	..	25820	35,238,369	2,95	
	April	..	540	118700	..	25894	36,997,251	2,75	Drawing from 133 fms. below the adit, and discharging therein the water of a 9 inch pump, 7 feet stroke=19.32 gallons; average 52.98 gallons per minute.
	May	8,2	704	138690	..	21114	27,036,866	2,9	
	June	..	640	..	..	..	..	..
	July	..	708	131550	..	..	25,500,075	2,94	
	August	..	668	132430	..	..	27,207,822	2,7	
	September	..	490	103940	7 0	..	31,351,273	2,58	Skewes's, ... 141.64
	October	..	540	113750	..	..	31,133,375	2,4	Stephens's, ... 62.93
	November	..	366	75050	..	..	30,306,866	2,37	Total 194.57 gallons.
	December	..	702	150710	..	..	31,730,251	2,5	per minute from Wh. Damsel Mine.
	Total	7272				Average	31,277,924	2,74	
DOLCOATH, <i>Great.</i>	January	11,49	4014	344500	7 3	62898	39,136,925	7,7	Diameter of the cylinder, 76 inches; length of the stroke, 9 feet; working single.
	February	10,7	4140	326700	..	58750	33,612,024	7,3	
	March	11,1	4307	174780	..	60824	38,579,703	6,7	
	May	..	3000	..	..	..	..	..
	June	11,9	936	86300	7 6	64920	44,892,596	6,6	
	July	..	5608	206260	..	64919	35,764,404	4,9	
	August	..	3828	355580	..	..	32,682,953	4,8	
	September	..	2077	..	..	..	..	..
	October	..	3213	103480	..	64514	41,277,259	5,13	
	November	11,8	1260	114980	..	..	44,146,008	4,7	
	December	..	2952	274360	..	..	44,969,667	5,29	
	Total	35335				Average	39,229,059	5,9	

TABLE III.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumps. Feet, fms.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes of the cylinder, 64 inches; length of the stroke, 7 feet 9 ins.; working single.	REMARKS.
DOLCOATH, Stray-Park.	January	7,36	2340	336470	5 3	34936	26,373,208	7.8	Diameter of the cylinder, 64 inches; length of the stroke, 7 feet 9 ins.; working single. Jeffree, Engineer.
	February	..	2052	291240	..	..	26,031,916	6.5	
	March	..	1620	243560	..	..	27,575,502	5.8	
	April	..	1620	244600	..	..	27,693,249	5.28	
	May	..	1386	227010	..	..	30,040,990	5.6	Drawing from 162 fms. below the adit; and discharging therein the water of an 114 inch pump, 5 feet 3 ins. stroke, = 22.65 galls.; average 114.38 galls. per minute.
	June	..	1612	266370	..	..	32,312,180	5.2	
	July	..	1098	199100	..	..	33,258,403	4.6	
	August	7.4	972	167040	..	35120	31,636,044	3.96	
	September	7.5	1152	179780	..	35670	29,226,422	3.87	
	October	7.66	1080	156710	..	36408	27,735,058	3.6	Great Park...207.86
	November	..	1242	178600	..	..	27,436,281	3.87	Stray Park...114.38
	December	..	1404	184710	..	..	25,146,608	4.57	Total 322.25 galls. per minute from Dolcoath Mine.
		<i>Total</i>	17478			<i>Average</i>	28,713,820	5.05	
EAST CRINNES, Old.	January	9.47	2000	234630	5 6	26784		4.9	
	February	..	1620	300400	..	..	27,316,373	7.2	
	March	..	1836	274450	..	..	22,020,576	5.6	
	April	8.57	1584	192140	..	24243	16,173,784	4.76	
	May	..	1468	215050	..	..	19,636,676	4.5	
	June	..	1310	—	..	..	—	—	Sims and Son, Engineers.
	July	..	1188	—	..	..	—	—
	August	..	1224	181030	..	..	19,720,511	4.19	
	September	..	1350	264330	..	..	26,197,286	5.4	
	October	..	1224	208200	..	..	22,680,277	4.96	
	November	..	1098	173150	..	..	21,026,606	4.44	
	December	..	1368	223330	..	..	21,767,573	4.3	
		<i>Total</i>	17260			<i>Average</i>	21,831,073	5.02	

TABLE III.—Continued.

ENGINES.	Mouths.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
EAST CRINNES, <i>Taylor's.</i>	January	7,9	3510	424210	7 0	43843	37,091,302	8,9	Diameter of the cylinder, 70 inches; length of the stroke, 10 feet; working single.
	February	9,8	3312	307630	..	53361	35,013,068	7,36	Sims and Son, Engineers.
	March	..	2988	275890	..	..	34,931,600	5,65	
	April	8,16	2196	231140	..	48754	35,921,218	6,73	
	May	7,77	2646	340560	..	42743	38,501,299	7,1	Drawing from 60 fathoms below the adit, and discharging therein the water of a 20 inch pump; 7 feet stroke, $= 95.44$ gallons; average 555.46 gal.s. per minute.
	June	..	2382	..	..	..	..	—
	July	7,0	1657	215280	..	38725	35,239,750	5,75	
	August	..	1764	235480	..	..	36,263,196	5,46	
	September	..	2106	..	..	..	..	—
	October	8,4	1728	183170	..	46422	34,341,333	4,4	
	November	..	1602	149380	..	..	30,300,642	3,84	Old 304.96 Taylor's 555.46
	December	..	2178	203240	..	..	31,218,262	4,0	Total 860.42 gallons.
		<i>Total</i>	280638	..	<i>Average</i>	34,382,447	5,32	per minute from East Crinnes Mine.	
EAST WH. UNITY, <i>Taylor's.</i>	January	8,54	1180	236230	6 9	17442	..	5,0	
	February	..	1206	259750	..	..	25,357,609	6,2	
	March	..	1350	254290	..	..	22,176,630	5,2	
	April	..	1062	212180	..	..	23,522,310	5,26	
	May	..	1278	249710	..	..	23,004,094	—	
	June	..	1151	..	..	..	..	—
	July	..	936	180690	..	..	22,727,348	4.82	Drawing from 41 fathoms below the adit, and discharging therein the water of a 14 inch pump, 6 feet 9 inches stroke $= 45.09$ gallons; average 214.62 gallons, per minute.
	August	7,97	954	174320	..	16550	20,412,707	4,0	
	September	..	954	228730	..	..	26,784,067	4,67	
	October	..	738	177350	..	..	25,748,254	4,24	
	November	..	630	161040	..	..	28,555,842	4,1	
	December	..	810	213500	..	..	29,445,208	4,12	
		<i>Total</i>	12249	..	<i>Average</i>	24,777,456	4.76		

TABLE III.—Continued.

ENGINES	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in inches.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
GREAT WORK, <i>Breage.</i>	January	8,9	1806	276830	7 0	32470	34,839,806	7.1	
	February	..	2584	398410	..	..	35,044,353	7.9	Diameter of the cylinder, 60 inches; length of the stroke, 9 feet; working single.
	March	..	1890	—	..	..	—	—
	April	..	1908	302210	..	..	36,000,687	7.5	
	May	..	2070	350600	..	..	38,496,557	7.37	
	June	..	2140	—	..	..	—	—	Richards, Engineer.
	July	..	1584	294030	..	..	42,190,706	7.0	
	August	..	1584	287100	..	..	41,186,312	7.38	
	September	..	1692	302570	..	..	40,844,879	6.37	
	October	..	1584	258740	..	..	37,126,903	6.2	
	November	..	1458	229310	..	..	35,678,151	6.12	
	December	..	1950	338090	..	..	39,407,423	6.35	
		<i>Total</i>	22250			<i>Average</i>	38,066,577	6.93	
GREAT ST. GEORGE	January	9,4	3132	354780	6 6	42312	31,154,033	7.2	
	February	..	2214	258150	..	..	32,067,966	6.9	
	March	..	2466	284900	..	..	31,707,404	6.56	Diameter of the cylinder, 60 inches; length of the stroke, 10 ft. 4 ins.; working single.
	April	..	1746	246290	..	..	38,795,329	6.1	
	May	..	2268	287770	..	..	34,896,299	6.2	
	June	..	2444	303200	..	..	34,119,676	6.17	
	July	..	2024	210860	..	..	28,652,372	5.6	
	August	..	2200	—	..	..	—	—
	September	..	1870	207700	..	..	30,547,227	5.14	
	October	..	1616	176500	..	..	30,038,639	4.5	
	November	..	1448	161910	..	..	30,752,612	3.6	
	December	..	1800	—	..	..	—	—
		<i>Total</i>	25228			<i>Average</i>	32,273,156	5.8	

TABLE III.—Continued.

ENGINES.	Month.	Load per square inch on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WH. HARMONY, New.	January	5,0	1522	249180	7 0	25786	29,747,016	5,97	
	February	..	1800	298000	..	..	29,682,551	5,87	
	March	..	1332	220320	..	..	29,856,006	5,1	
	April	..	1512	247070	..	..	29,495,126	6,6	
	May	..	2052	388280	..	..	34,152,878	7,49	
	June	..	1200	—	..	..	—	—
	July	..	1314	223420	..	..	30,690,834	5,37	Drawing from 44 fathoms
	August	..	720	116630	..	..	29,238,817	2,53	below the adit; and discharging therein the water of a 16
	September	..	324	44580	..	..	24,821,596	1,03	inch pump, 7 feet stroke, =
	October	..	162	14870	..	..	—	0,35	61,08 gallons; average 251,03
	November	..	72	5900	..	..	—	0,14	gallons per minute.
	December	..	90	—	..	..	—	—
		<i>Total</i>	12090	—	—	<i>Average</i>	29,585,978	4,11	
WHEAL HOPE,	January	8,8	1998	—	8 0	28133	—	—	
	February	9,47	1106	323880	..	30137	70,602,317	8,0	
	March	..	949	277350	..	..	70,461,512	7,13	
	April	..	926	273100	..	..	71,105,310	6,77	
	May	..	1175	330580	..	..	67,831,077	6,55	
	June	..	909	—	..	..	—	—
	July	9,6	909	262520	..	30588	70,904,739	6,0	Drawing from 75 fathoms be-
	August	..	780	238430	..	..	74,800,993	5,7	low the adit; and discharg-
	September	9,9	892	246120	..	31766	69,468,749	5,34	ing therein the water of a 15
	October	10,0	910	247390	..	31902	68,765,720	5,2	inch pump, 8 feet stroke, =
	November	10,38	683	182220	..	33858	70,519,940	5,0	61,36 gallons; average, 374,9
	December	10,53	948	251170	..	34447	70,968,242	5,45	gall. per minute.
		<i>Total</i>	12185	—	—	<i>Average</i>	70,542,880	6,11	

TABLE III.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load, in pounds.	Pounds lifted one foot high by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WH. MONTAGUE.	January	6.43	1530	279160	6 9	16035	19,735,465	6.65	
	February	..	1728	317660	..	..	19,934,405	6.3	
	March	..	1332	265400	..	..	21,606,339	6.14	Diameter of the cylinder, 50 inches; length of the stroke, 8 feet 8 ins.; working single.
	April	6.5	1368	219700	..	16196	17,557,209	5.87	
	May	..	1152	315220	..	..	28,912,936	6.0	
	June	..	970	—	..	..	—	—	Michell, Engineer.
	July	6.6	1098	247670	..	16589	27,512,930	5.9	
	August	..	1170	299460	7 0	..	29,721,532	6.5	
	September	8.1	1314	248250	..	20397	26,974,799	5.74	
	October	..	1134	218270	..	..	27,481,809	5.4	
	November	8.32	1026	210630	..	21010	30,106,346	5.4	
	December	8.37	1348	349660	..	21130	38,386,625	6.39	
	Total	15080	—	—	—	Average	25,359,708	6.02	
NORTH DOWNS, <i>Lemon's.</i>	January	6.0	2196	265650	7 9	30885	28,971,108	7.1	
	February	5.5	3600	—	..	26889	—	—	
	March	7.9	2808	288150	..	38817	30,870,808	6.87	Diameter of the cylinder, 70 inches; length of the stroke, 9 ft. 10 ins.; working single.
	April	..	1800	198660	..	..	33,201,797	5.3	
	May	..	2250	275230	..	..	36,789,076	5.3	
	June	..	1530	—	..	..	—	—	Sims and Son, Engineers.
	July	..	1584	212740	..	..	40,403,375	6.0	
	August	..	1692	205790	..	..	36,588,750	4.47	
	September	..	1584	—	..	..	—	—
	October	..	1728	240750	..	..	41,912,756	5.97	
	November	..	1260	218450	..	..	52,165,857	5.6	
	December	..	1188	236840	..	..	48,148,273	8.2	
	Total	232220	—	—	—	Average	38,329,044	5.73	

TABLE III.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumpa. Feet. <i>Ins.</i>	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
POLDICE, <i>Sims's.</i>	January	11.5	4624	333360	7 0	91129	45,988,612	8,27	Diameter of the cylinder, 90 inches; length of the stroke, 10 feet; working single. Sims and Son, Engineers.
	February	..	5456	382190	..	..	44,684,777	7,58
	March	..	3790	268280	..	..	45,130,964	6,65
	April	..	3680	263420	..	..	45,862,067	6,53
	May	..	4288	330990	..	..	49,239,625	6,57
	June	..	3680	..	..	..	..	..
	July	..	3792	278660	..	..	46,877,122	6,4
	August	..	3424	287160	..	..	53,498,897	6,23
	September	..	2960	247730	..	..	53,387,739	5,73
	October	10,67	3358	266180	..	..	53,807,597	5,4
	November	10,9	1968	164150	..	..	57,842,523	5,43
	December	10,9	4220	334290	..	..	50,496,840	5,66
	Total	46251	Average	49,633,251	6,4
POLDICE, <i>Oppie's.</i>	January	10.7	4096	3639010	6 3	46123	25,970,227	9,15	Diameter of the cylinder, 60 inches; length of the stroke, 9 ft. 6 ins.; working single. Sims and Son, Engineers.
	February	11.3	4528	435610	..	48535	29,182,787	8,64	
	March	11.9	3070	317850	..	51184	33,120,591	7,88	
	April	..	3136	293880	..	61380	30,093,180	7,3	
	May	..	3664	386660	..	..	33,838,152	7,67
	June	..	3136	..	..	..	..	..
	July	..	3312	304960	..	..	29,538,321	7,0
	August	..	3264	310300	..	..	30,528,519	6,73
	September	..	2448	262590	..	..	34,446,165	6,07
	October	..	2928	286600	..	..	31,432,522	5,88
	November	..	1920	180700	..	..	30,223,014	5,98
	December	..	3664	363970	..	..	31,912,147	6,16
	Total	39166	Average	30,942,327	7,13
	Total	39166	per minute from Poldice.	70,61	per minute from Poldice.

TABLE III.—Continued.

ENGINES.	Mouths.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in feet.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
PEMBROKE, <i>Carlyon's.</i>	January	10.97	3616	298030	7	74171	44,469,114	6.29	Diameter of the cylinder, 80 inches; length of the stroke, 9 ft. 9 ins.; working single. Sims and Son, Engineers.
	February	..	3264	259240	3	..	42,709,452	6.2	
	March	..	3440	259650	..	..	40,588,408	5.3
	April	..	2688	199730	..	..	39,956,384	4.95
	May	..	2800	234810	..	..	45,095,239	4.94
	June	..	2520	—	—	—	Drawing from 135 fms. below the adit, and discharging therein the water of an 18 $\frac{1}{4}$ inch pump, 7 ft. 3 ins. stroke = 39,31 gallons; average 376,97 gallons per minute.
	July	..	1920	167560	..	..	46,928,996	4.47
	August	..	1968	177850	..	..	48,596,043	4.1
	September	11.27	2160	194350	..	75533	49,27 $\frac{1}{2}$,606	3.97	
	October	..	1776	152400	..	..	46,931,222	3.68
	November	..	1600	128120	..	..	43,850,211	3.3
	December	..	2240	169790	..	..	41,508,671	3.28
	<i>Total</i>		29892			<i>Average</i>	44,542,395	4.58	
PEMBROKE, <i>Francis's.</i>	January	5.83	414	135890	6	10153	—	2.96	Diameter of the cylinder 40 inches; length of the stroke 19 feet; working single. Sims and Son, Engineers.
	February	6.1	404	132250	..	10604	22,563,028	3.16	
	March	..	346	124030	..	10842	24,796,321	2.53	
	April	..	230	71440	..	..	21,485,735	1.77
	May	..	256	88798	..	..	23,988,980	1.87
	June	..	280	—	—	—	Drawing from 50 fathoms below the adit, and discharging therein the water of a 10 ins. pump, 6 feet 6 inches stroke = 22,116 gallons; average 48,28 gallons per minute. Carlyon's... 376.97 Francis's... 48.28 Total 425.25 gallons.
	July	..	214	76220	..	..	24,637,224	2.0
	August	..	228	81630	..	..	24,765,754	1.89
	September	..	284	92030	..	..	22,416,461	1.88
	October	..	222	82400	..	..	25,675,023	2.0
	November	..	216	71870	..	..	23,016,034	1.87
	December	..	316	113190	..	..	25,094,012	2.18
	<i>Total</i>		3410			<i>Average</i>	23,853,757	2.18	per minute from Pembroke.

TABLE III.—Continued.

ENGINES.	Month.	Load per square inch on the piston.	Capacity of coal in bushels.	Number of strokes.	Length of the stroke, in feet.	Load in pounds.	Pounds lifted one foot high, by coal burning a bushel of coal.	Number of strokes per minute.	REMARKS.
W.H. PENROSE.	January	11.25	652	219500	6	14075	29,436,397	6.35	
	February	..	951	314770	..	..	28,940,801	6.3	
	March	..	723	237340	..	..	28,703,203	7.16	Diameter of the cylinder, 36 inches; length of the stroke, 8 ft. 6 ins.; working single.
	April	..	930	327820	..	14271	31,279,865	7.34	
	May	..	996	348800	..	..	31,086,838	7.34	
	June	..	850	—	..	..	—	—	Sims and Son, Engineers.
	July	9.8	828	313260	..	13117	32,256,889	6.58	
	August	..	732	298020	..	..	34,242,914	6.85	Drawing from 58 fathoms below the drift; and discharging therein the water of a 9 $\frac{1}{4}$ inch pump, 6 ft. 6 ins. stroke, = 20.52 galls.; average 139.74 gallons per minute.
	September	..	1104	422480	..	..	32,627,386	7.52	
	October	10.35	683	242370	..	13780	31,784,891	6.0	
	November	..	512	203590	..	..	35,616,320	6.6	
	December	..	1050	371350	..	..	31,677,923	6.45	
	<i>Total</i>	<i>10011</i>					<i>Average</i>	<i>31,512,129</i>	<i>6.81</i>
POLLADRAS.	January	7.5	2750	312300	7	6	39464	32,798,881	7.2
	February	..	2369	282040	..	..	34,384,711	6.09	
	March	..	1444	199470	..	..	39,896,072	6.7	
	April	..	2085	257600	..	..	35,682,858	5.2	
	May	..	1684	275770	..	..	47,296,028	6.6	
	June	..	1786	3223620	..	..	52,332,760	7.0	
	July	8.37	1294	177610	..	43932	44,171,671	4.4	
	August	8.55	1435	211180	..	44868	48,442,043	4.7	
	September	8.63	1676	245900	..	45653	49,044,065	5.15	
	October	8.7	1556	198410	..	46111	43,003,773	4.6	
	November	8.8	1548	210980	..	46482	46,288,821	4.56	
	December	8.97	1890	280580	..	47284	47,611,826	5.5	
	<i>Total</i>	<i>21617</i>					<i>Average</i>	<i>43,412,792</i>	<i>5.56</i>

TABLE III.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.	
									Feet. fms.	Feet. fms.
WH. PENWITH.	January	2.6	500	—	7 0	4083	—	—	Diameter of the cylinder, 40 inches; length of the stroke, 8 ft. 9 ins.; working single.	
	February	..	727	—	..	..	13,564,081	—	Eustis and Son, Engineers.	
	March	..	476	225350	..	..	14,942,340	6.5	Drawing from 47 fathoms below the adit; and discharging therein the water of an 8 <i>1</i> / ₄ inch pump, 7 ft. stroke, = 16.24 gallons; average 116,64 gallons per minute.	
	April	3.2	727	308400	..	5032	20,271,370	7.57	Drawing from 47 fathoms below the adit; and discharging therein the water of an 8 <i>1</i> / ₄ inch pump, 7 ft. stroke, = 16.24 gallons; average 116,64 gallons per minute.	
	May	3.76	639	305920	..	5893	21,835,925	7.88	Drawing from 47 fathoms below the adit; and discharging therein the water of an 8 <i>1</i> / ₄ inch pump, 7 ft. stroke, = 16.24 gallons; average 116,64 gallons per minute.	
	June	3.87	749	384410	..	6078	24,323,801	10.2	Drawing from 47 fathoms below the adit; and discharging therein the water of an 8 <i>1</i> / ₄ inch pump, 7 ft. stroke, = 16.24 gallons; average 116,64 gallons per minute.	
	July	..	721	412210	..	..	22,233,964	7.0	Drawing from 47 fathoms below the adit; and discharging therein the water of an 8 <i>1</i> / ₄ inch pump, 7 ft. stroke, = 16.24 gallons; average 116,64 gallons per minute.	
	August	3.75	622	335310	..	5892	22,360,563	6.76	Drawing from 47 fathoms below the adit; and discharging therein the water of an 8 <i>1</i> / ₄ inch pump, 7 ft. stroke, = 16.24 gallons; average 116,64 gallons per minute.	
	September	4.0	480	244000	..	6284	24,641,103	6.8	Drawing from 47 fathoms below the adit; and discharging therein the water of an 8 <i>1</i> / ₄ inch pump, 7 ft. stroke, = 16.24 gallons; average 116,64 gallons per minute.	
	October	4.65	631	304110	..	7304	26,097,129	5.8	Drawing from 47 fathoms below the adit; and discharging therein the water of an 8 <i>1</i> / ₄ inch pump, 7 ft. stroke, = 16.24 gallons; average 116,64 gallons per minute.	
	November	..	234	119440	..	..	..	..	Drawing from 47 fathoms below the adit; and discharging therein the water of an 8 <i>1</i> / ₄ inch pump, 7 ft. stroke, = 16.24 gallons; average 116,64 gallons per minute.	
PERRAN MINES.	Total	6740	—	—	—	—	Average	21,141,142	7.12	—
	January	15.7	1986	417430	6 3	18319	25,281,471	8.5	Diameter of the cylinder, 38 inches; length of the stroke, 6 ft. 9 ins.; working single.	
	February	..	1446	276970	..	..	23,038,933	7.3	Sims and Son, Engineers.	
	March	..	1434	291300	..	..	24,433,701	6.7	Drawing from 64 fathoms below the adit; and discharging therein the water of a 10 inch pump, 6 feet stroke, = 20.45 gallons; average 160,1 gallons per minute.	
	April	17.2	1414	274000	..	20693	25,571,088	6.78	Drawing from 64 fathoms below the adit; and discharging therein the water of a 10 inch pump, 6 feet stroke, = 20.45 gallons; average 160,1 gallons per minute.	
	May	16.44	1644	310820	..	19831	25,393,681	6.7	Drawing from 64 fathoms below the adit; and discharging therein the water of a 10 inch pump, 6 feet stroke, = 20.45 gallons; average 160,1 gallons per minute.	
	June	15.85	1588	329000	..	19221	25,250,698	6.7	Drawing from 64 fathoms below the adit; and discharging therein the water of a 10 inch pump, 6 feet stroke, = 20.45 gallons; average 160,1 gallons per minute.	
	July	12.9	982	252230	..	15147	24,259,201	6.7	Drawing from 64 fathoms below the adit; and discharging therein the water of a 10 inch pump, 6 feet stroke, = 20.45 gallons; average 160,1 gallons per minute.	
	August	9.7	1207	394600	..	11465	22,729,793	7.8	Drawing from 64 fathoms below the adit; and discharging therein the water of a 10 inch pump, 6 feet stroke, = 20.45 gallons; average 160,1 gallons per minute.	
	September	9.1	1012	315640	..	10745	20,169,068	7.8	Drawing from 64 fathoms below the adit; and discharging therein the water of a 10 inch pump, 6 feet stroke, = 20.45 gallons; average 160,1 gallons per minute.	
	October	8.2	960	294000	6 0	10484	19,264,350	7.55	Drawing from 64 fathoms below the adit; and discharging therein the water of a 10 inch pump, 6 feet stroke, = 20.45 gallons; average 160,1 gallons per minute.	
	November	..	1246	394780	..	..	19,930,370	7.6	Drawing from 64 fathoms below the adit; and discharging therein the water of a 10 inch pump, 6 feet stroke, = 20.45 gallons; average 160,1 gallons per minute.	
	December	..	1276	391100	..	..	19,250,199	7.97	Drawing from 64 fathoms below the adit; and discharging therein the water of a 10 inch pump, 6 feet stroke, = 20.45 gallons; average 160,1 gallons per minute.	
	Total	16095	—	—	—	—	Average	22,881,046	7.34	—

TABLE III.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load, in pounds.	Pounds lifted one foot high by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL ROSE.	January	17.1	878	158280	6 0	36235	39,130,847	10,0	Diameter of the cylinder, 46
	February	17.5	3346	657220	..	37063	37,033,314	10,2	inches; length of the stroke, 8 feet; working single.
	March	..	2862	458310	..	..	25,610,783	9,64	Slims and Son, Engineers.
	April	18.3	2420	355000	..	38866	34,208,504	9,13	
	May	..	2894	390680	..	..	33,817,748	9,0	
	June	..	2890	—	..	..	—	—
	July	..	2052	283270	..	..	32,191,730	7,8	Drawing from 84 fms. below the adit; and discharging therein the water of a 16 ¹ /2 inch pump, 6 feet stroke,
	August	18.0	2394	353970	..	38080	33,782,400	7,45	—47.56 galls. average 419.48
	September	..	2478	361970	..	..	33,374,861	7.4	gallons per minute.
	October	..	2200	—	..	..	—	—
	November	..	2100	—	..	..	—	—
	December	..	2400	—	..	..	—	—
	Total	15.2	28714	—	7 6	17044	34,900,773	8.82	
WHEAL REETH.	January	1406	381740	..	..	..	31,279,330	8.55	Diameter of the cylinder, 36
	February	..	1400	168500	..	..	27,187,970	4,18	inches; length of the stroke, 7 ft. 6 ins.; working single.
	March	..	714	224360	..	..	28,095,237	4,69	Eustis and Son, Engineers.
	April	..	920	160300	..	..	26,687,170	4.0	
	May	..	692	170640	..	17453	27,042,150	3.6	
	June	15.29	736	—	..	..	25,620,933	2.9	
	July	..	634	117300	..	..	25,666,915	3.2	
	August	..	700	154040	..	..	23,742,416	2.88	
	September	..	508	103000	..	..	24,942,480	3.09	
	October	..	650	139000	..	..	24,178,929	3.8	
	November	..	974	201910	..	..	24,514,685	5.09	
	December	..	1122	235620	..	..	—	—
	Total	10354	—	—	—	—	Average	4.18	
							Total	26,268,908	

TABLE III.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump. Feet. In.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
St. IVES CONSOLS.	January	14.2	989	—	7 0	14830	—	—	
	February	..	1378	..	..	..	28,442,303	7.3	Diameter of the cylinder, 36 inches; length of the stroke 7 feet; working single.
	March	..	264	73760	..	..	29,272,383	6.69	—
	April	..	938	269720	..	..	—	—	Woolf, Engineer.
	May	..	1172	—	..	..	—	—
	June	..	720	—	..	..	31,686,258	6.7	Drawing from 139 fins, below the adit, and discharging therein the water of an 8 $\frac{1}{4}$ in. pump, 7 feet stroke = 16.24 gallons; average 105.23 gallons per minute.
	July	13.0	875	299560	..	13222	34,310,974	6.29	
	August	14.3	862	289950	..	14572	33,057,705	6.0	
	September	..	752	243710	..	..	31,208,331	6.18	
	October	14.6	1036	311500	..	14930	32,676,315	6.38	
	November	16.1	1128	321090	..	16545	28,191,884	6.32	
	December	..	1042	254770	..	16647	—	—	
	Total	11156	—	—	—	Average	31,105,769	6.48	
TING-TANG.	January	12.0	3438	263520	6 9	43195	30,829,017	9.35	
	February	13.9	4028	316060	..	49844	26,389,582	6.27	Diameter of the cylinder, 63 inches; length of the stroke, 7 feet 9 ins.; working single.
	March	14.2	2884	284840	..	51684	34,389,392	7.06	
	April	..	2882	334970	..	..	40,469,768	7.75	Sims and Son, Engineers.
	May	..	2998	380280	..	..	44,166,262	8.0	
	June	..	2600	—	..	..	—	—
	July	..	2880	350250	..	..	42,345,225	7.84	Drawing from 124 fathoms below the adit, and discharging therein the water of a 14 ins. pump, 6 ft. 9 ins. stroke =
	August	..	2886	361980	..	..	43,652,397	7.39	
	September	..	2185	293760	..	..	46,812,302	7.28	
	October	15.0	2514	303300	..	53764	43,782,694	6.38	
	November	..	1797	209010	..	..	42,209,900	5.58	
	December	13.3	3632	446590	..	47711	39,599,111	7.38	
	Total	34724	—	—	—	Average	39,515,969	7.3	

TABLE III.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumpa. Feet. fms.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.	
TRESAVEAN.	January	6,22	1410	179970	7 0	22611	20,202,206	4,3	Diameter of the cylinder, 60 inches; length of the stroke, 9 feet; working single. Michell, Engineer.	
	February	6,26	1530	197580	..	22770	20,583,187	3,9		
	March	..	1175	156520	..	..	21,036,453	3,98
	April	..	930	154100	..	..	26,410,761	3,9
	May	5,5	1110	178180	..	229108	24,841,823	3,75		
	June	..	1680	—	..	..	—	—
	July	..	1864	183820	..	..	24,439,216	4,1
	August	..	1386	196500	..	..	21,940,515	4,0
	September	..	1332	188650	..	..	21,917,957	4,68
	October	..	1375	198470	..	..	22,337,762	4,18
	November	5,6	1086	141620	..	229218	20,267,071	4,47		
	December	..	2019	257070	..	..	19,802,411	4,25
	Total	16887	—	—	Average	52790	34,028,848	4,12		
TRESKERBY, Sims's.	January	15,47	3060	328750	6 0	..	38,825,570	6,7	Diameter of the cylinder, 58 inches; length of the stroke, 7 ft. 9 ins.; working single. Sims and Son, Engineers.	
	February	..	3114	381710	..	..	42,511,946	8,0
	March	..	2772	372050	..	..	40,380,760	8,6
	April	..	2718	346600	..	..	35,135,995	7,0
	May	..	3204	355420	..	..	—	—
	June	..	2322	—	..	..	37,284,490	7,4
	July	..	1360	160090	..	..	43,165,976	7,15
	August	..	2574	350790	..	..	38,924,099	7,3
	September	..	2322	285350	..	..	45,469,320	7,32
	October	..	2718	390180	..	..	49,791,967	7,15
	November	..	1440	226370	..	..	47,798,946	7,93
	December	..	2574	388440	..	..	Total	30178
	Total	—	—	—	Average	41,211,626	7,58	—		

TABLE III.—Continued.

ENGINES.	Mouth.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WH. TREVOOLE.	January	16,62	943	346760	7 0	14183	36,507,613	11.2	
	February	16,3	1334	513710	..	14838	39,997,763	9,64	Diameter of the cylinder, 30 inches; length of the stroke, 9 feet; working single.
	March	..	915	341550	..	..	38,770,964	7,6	
	April	16,6	802	308550	..	15100	40,665,504	7,66	
	May	20,17	1182	402590	..	18317	43,671,479	7,9	
	June	..	1000	—	..	..	—	—	Woolf, Engineer.
	July	20,8	1067	328160	..	18904	40,697,991	7,6	
	August	..	912	289430	..	..	41,995,277	6,96	
	September	21,26	987	301510	..	19296	41,261,964	6,54	
	October	21,76	1169	314490	..	19754	37,200,212	6,2	
	November	22,19	1251	349690	..	20146	39,419,658	6,97	
	December	..	1112	292920	..	..	37,147,629	9,7	
	<i>Total</i>	<i>12674</i>				<i>Average</i>	<i>39,700,548</i>	<i>7,99</i>	
W.H. TOWAN, <i>Wilson's.</i>	January	9,6	2034	274320	8 0	59727	64,441,733	7,0	
	February	..	2185	333860	..	..	73,008,530	6,6	
	March	..	1583	279230	..	..	84,283,361	6,9	
	April	..	1650	300600	..	..	87,049,387	6,9	
	May	9,44	2000	—	..	59336	—	—	
	June	9,49	1980	316000	..	59673	76,188,557	6,8	
	July	10,1	1644	244980	..	63621	75,843,662	6,54	
	August	..	1898	305730	..	..	81,984,608	6,4	
	September	..	1856	297600	..	..	81,610,386	6,4	
	October	10,17	1610	244610	..	64062	77,864,376	6,5	
	November	10,3	2250	321010	..	65092	74,293,983	6,34	
	December	..	2247	317630	..	..	73,609,869	6,47	
	<i>Total</i>	<i>22937</i>				<i>Average</i>	<i>77,285,314</i>	<i>6,62</i>	

TABLE III.—Continued.

ENGINES.	Mouths.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps. Feet. Ins.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WH. TOWAN, <i>Druce's.</i>	January	4,55	793	167,430	8 0	28824	48,348,210	4,3	Diameter of the cylinder, 80 inches; length of the stroke, 10 feet; working single. Grose, Engineer.
	February	..	839	201,750	..	..	49,200,357	4,0
	March	..	707	159,960	..	..	51,518,341	3,9
	April	..	798	176,660	50,821,264	4,06	Drawing from 91 fathoms below the adit; and discharging therein the water of a 14 inch pump, 8 feet stroke, = 63.44 gallons; average 200,93 gallons per minute. Wilson's, 462,14 Druce's, 200,93 Total 663,07 gallons per minute from Wheal Towan Mine.
	May	..	800	176,100	..	..	50,406,864	3,9
	June	4,6	775	174,350	..	29016	52,221,312	3,78	
	July	4,8	563	130,400	..	30341	56,219,771	3,46	
	August	..	636	153,120	..	..	58,437,910	3,2
	September	4,89	646	153,390	..	30782	58,438,149	3,3	
	October	4,96	577	132,920	..	31223	57,368,068	3,6	
	November	5,1	812	137,870	..	32106	59,426,149	3,7	
	December	..	859	197,930	..	..	68,913,576	4,0
	<i>Total</i>	<i>14,4</i>	<i>8903</i>	<i>301480</i>	<i>5 6</i>	<i>51854</i>	<i>Average</i>	<i>54,276,664</i>	<i>3,76</i>
WHEAL UNITY, <i>Western.</i>	January	14,4	3504	301480	5 6	24,538,011	<i>7,47</i>	Diameter of the cylinder, 66 inches; length of the stroke, 7 feet; working single.	
	February	..	4096	413750	..	28,808,656	<i>8,1</i>		
	March	..	2768	279950	..	28,844,256	<i>6,94</i>		
	April	..	2688	248900	..	26,408,308	<i>6,17</i>	Diameter of the cylinder, 100 fms. below the adit; and discharging therein the water of a 16 inch pump, 6 ft. 6 ins. stroke, = 48 gallons; average, 300,48 gallons, per minute.	
	May	..	3104	317000	..	29,125,821	<i>6,9</i>		
	June	..	2688	—	..	—	—		
	July	..	2752	253530	..	26,273,980	<i>5,86</i>		
	August	..	2580	257180	..	38,651,157	<i>5,58</i>		
	September	..	2480	230450	..	26,501,471	<i>5,3</i>		
	October	..	2832	249930	..	25,169,239	<i>5,1</i>		
	November	..	1952	184110	..	26,899,856	<i>6,1</i>		
	December	..	3024	329560	..	31,081,191	<i>6,34</i>		
	<i>Total</i>	<i>34448</i>	<i>34448</i>	<i>Average</i>	<i>27,481,996</i>	<i>6,26</i>			

TABLE III.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes, per minute.	REMARKS.
UNITED MINES, <i>Cardozo's.</i>	January	7.9	38834	282950	8	57557	31,579,787	6,5	
	February	..	5598	448180	..	..	36,364,446	8,9	
	March	..	3348	283320	..	..	38,965,470	6,78	Diameter of the cylinder, 90 inches; length of the stroke, 9 feet; working single.
	April	..	2772	222710	..	..	36,994,284	5,7	
	May	..	4016	308890	..	..	35,415,899	6,3	
	June	..	3000	—	..	..	—	—
	July	..	33112	252840	..	..	35,151,477	5,6	
	August	..	2934	220450	..	..	34,596,975	4,8	Drawing from 52 fms. below the adit, and discharging therein the water of a 16 & a 15 inches pump, 8 ft. stroke, $\frac{1}{2} = 131.17$ gallons; average 725.37 gallons per minute.
	September	..	2178	177390	..	..	37,502,428	4,1	
	October	..	2270	186270	..	..	37,783,761	3,9	
	November	..	1433	122180	..	..	39,259,256	3,85	
	December	..	3151	269460	..	..	39,376,221	4,45	
	<i>Total</i>	<i>37846</i>				<i>Average</i>	<i>36,679,064</i>	<i>5,53</i>	
UNITED MINES, <i>Little.</i>	January	12.9	486	163900	7	6	10942	27,675,830	4,0
	February	..	981	357390	..	..	29,897,258	7,1	
	March	..	702	282460	..	..	33,020,056	6,76	
	April	..	594	251980	..	..	34,812,691	6,74	
	May	..	756	345250	..	..	37,477,435	7,0	
	June	..	868	—	..	..	—	—
	July	..	964	374170	..	..	31,852,967	8,38	
	August	..	900	385760	..	..	36,269,082	8,37	Drawing from the adit level the condensing water of the Consolidated engines of the Consolidated and the United Mines.
	September	..	846	362700	..	..	35,183,186	8,4	
	October	..	864	371560	..	..	35,291,749	7,8	
	November	..	486	197590	..	..	33,364,657	6,84	
	December	..	1062	400890	..	..	30,978,378	6,63	
	<i>Total</i>	<i>9509</i>				<i>Average</i>	<i>33,256,682</i>	<i>7,09</i>	

TABLE III.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Length of the stroke, in the pump.	Number of strokes.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WH. TOWAN, <i>Druce's.</i>	January	4.55	793	16730	8 0	28624	48,348,210	4.3	Diameter of the cylinder, 30 inches; length of the stroke, 10 feet; working single.
	February	..	939	201750	..	..	49,200,357	4.0	
	March	..	707	159060	..	..	51,518,341	3.9	Grose, Engineer.
	April	..	796	176860	..	..	50,821,264	4.06	
	May	..	800	176100	..	..	50,406,864	3.9	
	June	4.6	775	174350	..	29016	52,221,312	3.78	
	July	4.8	563	130400	..	30341	56,219,771	3.46	
	August	..	636	153120	..	..	58,427,910	3.2	
	September	4.89	646	153300	..	30782	58,438,149	3.3	
	October	4.96	577	132520	..	31223	57,368,068	3.5	
	November	5.1	812	137870	..	32106	59,426,149	3.7	
	December	..	859	197030	..	..	58,913,575	4.0	Total 663.07 gallons per minute from Wheal Towan Mine.
		<i>Total</i>	8903				<i>Average</i>	54,276,684	3.76
WAL. UNITY, <i>Eastern.</i>	January	14.4	3504	301480	5 6	51854	24,538,011	7.47	
	February	..	4096	413750	..	..	28,808,656	8.1	
	March	..	2768	279950	..	..	28,844,255	6.94	
	April	..	2688	248900	..	..	26,408,308	6.17	
	May	..	3104	317000	..	..	29,125,821	6.9	
	June	..	2688	..	..	..	..	—	Sims and Son, Engineers.
	July	..	2752	253530	..	..	26,273,980	5.86	
	August	..	2560	257180	..	..	38,651,157	5.58	
	September	..	2480	230450	..	..	26,501,471	5.3	
	October	..	2832	249930	..	..	25,169,239	5.1	
	November	..	1952	184110	..	..	26,899,856	6.1	
	December	..	3024	329360	..	..	31,081,191	5.34	
		<i>Total</i>	34448				<i>Average</i>	27,481,996	6.26

TABLE III.—Continued.

MINES, 20's.	Month.	Load per square inch, on the piston.	Consump- tion of coal, in bushels.	Number of strokes.	Length of the stroke, in pounds.	Load in pounds.	Pounds lifted one foot high, by con- suming a bushel of coal.	Number of strokes, per minute.	REMARKS.	
									Feet. lbs.	Feet. lbs.
MINES, 20's.	January	7.9	3834	262950	8 0	67667	31,579,787	6.5		
	February	..	5598	448180	..	..	36,864,446	8.9		
	March	..	3348	283320	..	..	38,965,470	6.78	Diameter of the cylinder, 90 inches; length of the stroke, 9 feet; working single.	
	April	..	2772	222710	..	..	36,994,284	5.7		
	May	..	4016	308890	..	..	35,415,899	6.3		
	June	..	3000	..	..	..	..	..
	July	..	3312	262840	..	..	35,151,477	6.6		
	August	..	2834	220460	..	..	34,596,975	4.8		
	September	..	2178	177390	..	..	37,502,428	4.1		
	October	..	2270	186270	..	..	37,783,761	3.9		
	November	..	1433	122180	..	..	39,259,256	3.85		
	December	..	3151	209460	..	..	39,326,221	4.45		
	Total		37846				Average	36,679,064	5.53	
UNITED MINES, 1866.	January	12.9	486	103900	7	4	10942	27,075,830	4.0	
	February	..	981	357390	..	..	..	29,897,258	7.1	
	March	..	702	212460	..	..	..	33,020,056	6.76	
	April	..	584	251980	..	..	..	34,812,691	6.74	
	May	..	763	343250	..	..	..	37,477,436	7.0	
	June	..	808	..	..	..	..	..	..
	July	..	804	371170	..	..	..	31,832,967	8.38	
	August	..	900	316780	..	..	..	36,269,082	8.37	
	September	..	849	309700	..	..	..	35,183,186	8.4	
	October	..	814	371080	..	..	..	35,231,749	7.8	
	November	..	486	107530	..	..	..	33,364,657	6.84	
	December	..	1042	400890	..	..	..	30,973,378	6.63	
	Total						Average	33,256,682	7.09	

TABLE III.—Continued.

ENGINES.	Month.	Load per square inch on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump. Feet. <i>Int.</i>	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.	
									Diameter of the cylinder, 80 inches; length of the stroke, 10 feet; working single.	Grose, Engineer.
WH. TOWAN, Druse's.	January	4,55	793	167430	8 0	28624	48,348,210	4,3	Drawing from 91 fathoms below the adit; and discharging therein the water of a 14 inch pump, 8 feet stroke, = 63,44 gallons; average 200,93 gallons per minute.	Wilson's..... 462,14 Druse's..... 200,93 Total..... 663,07 gallons per minute from Wheal Towan Mine.
	February	..	939	201750	..	..	49,200,357	4,0
	March	..	707	159060	..	..	51,518,341	3,9
	April	..	796	176860	..	..	50,821,264	4,06
	May	..	800	176100	..	..	50,406,864	3,9
	June	4,6	775	174350	..	29016	52,221,312	3,78		
	July	4,8	563	130400	..	30341	56,219,771	3,46		
	August	..	636	153120	..	..	58,437,910	3,2
	September	4,89	646	153300	..	30782	58,438,149	3,3		
	October	4,96	577	132620	..	31223	57,368,068	3,5		
	November	5,1	812	137870	..	32106	59,426,149	3,7		
	December	..	859	197030	..	..	58,913,575	4,0
	<i>Total</i>	<i>8903</i>				<i>Average</i>	<i>54,276,684</i>	<i>3,76</i>		
WHEAL UNITY, Western.	January	14,4	3504	301480	5 6	51854	24,538,011	7,47	Drawing from 100 fms. below the adit; and discharging therein the water of a 16 inch pump, 6 ft. 6 ins. stroke, = 48 gallons; average, 300,48 gallons per minute.	Sims and Son, Engineers.
	February	..	4096	413750	..	..	28,808,656	8,1
	March	..	2768	279950	..	..	28,844,255	6,94
	April	..	2688	248900	..	..	26,408,308	6,17
	May	..	3104	317000	..	..	29,125,821	6,9
	June	..	2688	—	..	..	—	—
	July	..	2752	253530	..	..	26,273,980	5,86
	August	..	2560	257180	..	..	39,651,157	5,58
	September	..	2480	230450	..	..	26,501,471	5,3
	October	..	2832	249930	..	..	26,169,239	5,1
	November	..	1952	184110	..	..	26,899,856	6,1
	December	..	3024	329580	..	..	31,081,191	5,34
	<i>Total</i>	<i>34448</i>				<i>Average</i>	<i>27,481,996</i>	<i>6,26</i>		

TABLE III.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes, per minute.	REMARKS.
UNITED MINES, <i>Cardozo's.</i>	January	7.9	3834	262950	8 0	57557	31,570,787	6.5	
	February	..	5598	448180	..	..	36,884,446	8.9	
	March	..	3348	283320	..	..	38,965,470	6.78	Diameter of the cylinder, 90 inches; length of the stroke, 9 feet; working single.
	April	..	2772	222710	..	..	36,994,284	5.7	
	May	..	4016	308890	..	..	35,415,899	6.3	
	June	..	3000	252840	..	..	35,151,477	5.6	
	July	..	3312	220450	..	..	34,596,975	4.8	
	August	..	2994	177390	..	..	37,502,428	4.1	
	September	..	2178	177390	..	..	37,783,761	3.9	
	October	..	2270	186270	..	..	39,259,256	3.85	
	November	..	1433	192180	..	..	39,376,221	4.45	
	December	..	3151	269460	..	..	36,679,064	5.53	
		<i>Total</i>	<i>37846</i>			<i>Average</i>			
UNITED MINES, <i>Little.</i>	January	12.9	486	163900	7 6	10942	27,675,830	4.0	
	February	..	981	357390	..	..	29,897,258	7.1	
	March	..	702	282460	..	..	33,020,056	6.76	
	April	..	594	251980	..	..	34,812,691	6.74	
	May	..	756	345250	..	..	37,477,435	7.0	
	June	..	868	..	..	..	..	..
	July	..	964	374170	..	..	31,852,967	8.38	
	August	..	900	385760	..	..	36,269,082	8.37	
	September	..	846	362700	..	..	35,183,186	8.4	
	October	..	864	371560	..	..	35,291,749	7.8	
	November	..	486	197590	..	..	33,364,657	6.84	
	December	..	1062	400890	..	..	30,973,378	6.63	
		<i>Total</i>	<i>9509</i>			<i>Average</i>	<i>33,256,362</i>	<i>7.09</i>	

TABLE III.—Continued.

ENGINES.	Mol. in.	Load per square inch on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
UNITED HILLS.	January	5.7	862	163030	6 ' 6	18993	20,921,816	4,18	
	February	5.8	1148	191190	..	19575	21,190,863	3,77	
	March	..	764	136720	..	..	23,071,500	3,3	
	April	..	878	165350	..	..	23,962,096	3,8	
	May	5.9	840	173400	..	18740	26,486,850	3,87	
	June	6.19	620	186610	..	20767	40,628,458	4,0	Mitchell, Engineer.
	July	6.54	656	159120	..	21936	34,685,314	4,2	
	August	5.7	794	199600	..	19109	31,224,202	4,18	
	September	6.68	822	183270	..	22420	32,491,407	4,0	
	October	6.79	614	142050	..	227923	34,274,306	3,77	
	November	..	796	201380	..	..	37,478,955	3,97	
	December	..	886	229220	..	..	38,327,860	4,67	
<i>Total</i>		9770				<i>Average</i>	30,387,010	3,98	
WHEAL VOR, Pearce's.	January	17.09	4546	252500	5 ' 9	67166	21,451,086	5,8	
	February	17.5	61390	313710	..	69042	23,986,185	6,8	
	March	..	34382	266140	..	..	23,844,938	6,0	
	April	..	4912	285000	..	..	27,169,668	6,0	
	May	..	4370	290120	..	..	26,849,845	6,9	
	June	..	4078	266050	..	..	26,931,844	5,7	
	July	..	8701	221070	..	..	23,713,296	5,46	
	August	..	8898	249710	..	..	26,821,630	5,68	
	September	..	4201	244320	..	..	23,088,065	5,1	
	October	..	3707	228080	..	..	23,384,816	5,1	
	November	..	4904	234000	..	..	21,663,646	5,06	
	December	..	4418	247340	..	..	22,225,413	5,18	
<i>Total</i>		49851				<i>Average</i>	24,170,862	5,72	

TABLE III.—Continued.

ENGINES.	Mouths.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, feet, fms.	Load in pounds.	Plants lifted out foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL VOR, <i>Western.</i>	January	19.58	3300	319440	7 6	61840	37,635,840	7,4	
	February	..	3759	349100	..	..	36,108,028	7,56	
	March	..	2638	255000	..	..	37,611,532	7,4	
	April	..	3423	322700	..	..	36,653,742	6,59	
	May	..	2976	308390	..	..	40,073,191	7,3	Diameter of the cylinder, 53 inches; length of the stroke, 9 feet; working single.
	June	..	2415	290500	..	..	46,768,695.	6,28	Sims & Richards, Engineers.
	July	..	2198	230600	..	..	40,790,031.	5,7	Drawing from 140 fms. below the adit; and discharging therein the water of a 12 inch pump, 7 feet 6 ins. stroke, = 36.81. galls.; average 250,79 galls. per minute.
	August	..	2247	225600	..	..	39,160,609	6,2	
	September	..	2493	265400	..	..	41,390,902	6,57	
	October	..	2213	210000	..	..	36,894,713	4,8	
	November	..	2205	231740	..	..	40,861,910	5,0	
	December	..	2801	262260	..	..	36,491,327	5,5	
		Total	32665			<i>Average</i>	39,204,043	6.27	
WHEAL VOR, <i>Old.</i>	January	7.9	806	216810	5 0	20097	27,029,966	5,0	
	February	..	944	276000	..	..	29,379,088	6,0	
	March	..	769	230150	..	..	30,073,631	6,6	
	April	..	1018	297400	..	..	29,355,833	6,0	
	May	..	764	242720	..	..	31,923,710	5,79	Diameter of the cylinder, 48 inches; length of the stroke, 7 feet; working single.
	June	..	826	264300	..	..	30,936,241	5,5	Sims & Richards, Engineers.
	July	..	705	208000	..	..	31,085,765	5,18	Drawing from 96 fathoms below the adit; and discharging therein the water of a 10 inch pump, 5 feet stroke, = 17.04. galls.; average 86,22 galls. per minute.
	August	..	614	197510	..	..	32,271,207	4,4	
	September	..	737	212080	..	..	28,912,916	4,45	
	October	..	676	168000	..	..	24,972,603	3,98	
	November	8.09	576	163010	..	20536	29,129,547	3,5	
	December	..	751	208840	..	..	28,623,037	4,4	
		Total	9187			<i>Average</i>	29,472,795	5.08	

TABLE III.—Continued.

ENGINES.	Months.	Load per square inch on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.	
									Feet.	Ins.
WHEAL VOR, <i>Trelawney's.</i>	January	14.2	4624	296600	7 6	96307	45,850,004	6.86	Diameter of the cylinder, 80 inches; length of the stroke, 10 feet; working single.	
	February	..	4287	287630	..	..	47,958,629	6.28	Sims & Richards, Engineers.	
	March	..	2987	215600	..	..	51,594,047	6.2	Drawing from 192 fms. below the adit; and discharging therein the water of a 15 inch pump, 7 ft. 6 inches stroke, = 57,62 gallons; average 337.06 gallons per minute.	
	April	..	3750	29420	..	..	56,548,731	5.9	Pearce's . . . 189,44	
	May	..	2473	207700	..	..	60,034,160	5.0	Western . . . 230,79	
	June	..	3329	288020	..	..	57,549,223	5.8	Old 86,22	
	July	..	2970	250400	..	..	60,264,830	6.18	Total 843,51 gallons.	
	August	14.8	3000	—	..	99316	—	—	per minute from Wheal Vor.	
	September	..	3937	285710	..	..	54,055,577	6.0		
	October	..	3076	230250	..	..	55,756,280	5.3		
	November	14.96	3259	265400	..	100085	61,128,932	5.75		
	December	..	3330	247370	..	..	55,761,320	5.18		
		<i>Total</i>	41022	—	—	<i>Average</i>	55,045,612	5.86		
WHEAL VOR, <i>Carleton.</i>	January	11.78	1336	324600	5 3	24081	30,716,793	7.5	Diameter of the cylinder, 70 inches; length of the stroke, 10 feet; working single.	
	February	12.3	1314	348400	..	25296	35,222,263	7.5	Sims & Richards, Engineers.	
	March	..	834	25080	..	..	40,936,753	7.4	Drawing from 116 fms. below the adit; and discharging therein the water of a 10 inch pump, 5 feet 6 inches stroke, = 18,75 gallons; average 120,56 gallons, per minute.	
	April	12.62	1068	324700	..	25813	41,201,100	6.6		
	May	..	856	281700	..	..	44,597,536	6.7		
	June	12.65	821	300200	..	26016	51,878,040	6.5		
	July	13.5	774	246500	..	26212	45,913,332	6.1		
	August	..	738	265010	..	..	51,768,877	5.9		
	September	13.6	798	276560	..	24408	50,336,692	5.8		
	October	13.65	738	239920	..	26495	47,373,634	5.5		
	November	13.7	726	260640	..	26604	52,530,944	5.65		
	December	..	896	287950	..	..	47,554,650	6.0		
		<i>Total</i>	10889	—	<i>Average</i>	45,001,718	6.43			

In 1829, 53 engines reported; average duty 41,7

The improvements begun in 1827, and assiduously pursued in 1828, began now to manifest themselves in the advanced general average of the duty of all. In noticing what may be called the best engines from this period, we must restrict ourselves to 50 millions and upwards; as all below that rate of duty, may be considered as not rising above mediocrity. In this year they are as follows:

Wheal Towan engine	by Grose	76,9
Wheal Hope	by ditto	61,9
Consolidated Mines	by Hocking and Loam	61,3
Ditto	by ditto	59,3
Wheal Rose	by Sims	58,3
Consolidated Mines	by Hocking and Loam	56,7
Wheal Tolgus	by Michell	55,2
Consolitated Mines	by Hocking and Loam	54,3
Cardrew	by Sims	51,8

In 1830, 56 engines reported; average duty43,3

The engines continued to improve throughout this year; and the emulation excited among the engineers and miners, produced a spirit of enquiry and rigid economy, which had the most beneficial results for the mines. The following are among the best.

Wheal Towan engine	by Grose	77,9
Consolidated Mines	by Hocking and Loam	67,5
Wheal Tolgus	by Michell	62,9
Consolidated Mines	by Hocking and Loam	62,1
Cardrew	by Sims	61,8
Wheal Rose	by ditto	61,1
Binner Downs	by Gregor and Thomas	60,0
Consolidated Mines	by Hocking and Loam	58,2
Marazion Mines	by Grose	55,7

Binner Downs	by Gregor and Thomas	55,1
Consolidated Mines	by Hocking and Loam	55,0
Ditto	by ditto	54,7
Pembroke.....	by Sims	53,8
Ditto	by ditto	52,1
Ting-Tang	by ditto	52,6

In 1831, 58 engines reported ; average duty 43,4

The general average of duty did not improve this year ; yet a great many continued to perform a duty exceeding 50 millions : but, at the same time, several that had not before been registered came into the report ; and, as was always found to be the case, their inferior performance had a tendency to keep down the average. We select the following as the best :

Wheal Towan engine	by Grose	76,6
Ditto	by ditto	71,0
Wheal Vor	by Richards	68,5
Consolidated Mines	by Hocking and Loam	65,8
East Crinnes	by Sims	64,6
Wheal Rose	by ditto	59,3
Consolidated Mines	by Hocking and Loam	58,6
Ditto	by ditto	57,9
Binner Downs	by Gregor	56,8
Polladdras	by Richards	56,6
Consolidated Mines	by Hocking and Loam	56,4
Ditto	by ditto	54,2
Great Work.....	by Richards	54,2
Ting-Tang	by Sims	54,0
Pembroke.....	by ditto	54,1
Wheal Tolgus	by Michell	53,4
Poldice.....	by Sims	53,8
Binner Downs	by Gregor	52,0
Marazion Mines	by Grose	52,0

Wheal Vor.....	by Richards	51,7
United Mines.....	by Hocking and Loam	51,0
In 1832. 59 engines reported ; average duty	45,0	

A start appeared to take place in the performance of the engines in this year. The engineers vied with each other in producing the best engines ; and the exertions which were made enabled them to attain to a rate of duty, which, but a few years before, was thought to be impossible : and no man was now presumptuous enough to say with Watt in 1798, when Herland engine succeeded in performing 20 millions, "The machine is perfect, and no further improvement can be expected." Captain Richards had lately erected a new engine of 80 inches cylinder at Wheal Vor, which throughout the month of December, performed the astonishing duty of 91,353,246 lbs. lifted one foot high by the consumption of one bushel of coal. Its average duty for the year was 85 millions. The engineers of the following mines succeeded in making their engines do above 55 millions in December of this year.

Wheal Vor engine.....	by Richards	91,4
Polgoooth.....	by Sims	71,0
Wheal Vor	by Richards	69,2
Consolidated Mines	by Hocking and Loam	65,3
Ditto	by ditto	65,2
Wheal Towan	by Grose	65,1
Ditto	by ditto	64,6
Wheal Darlington	by Eustis	64,1
Great work	by Richards	63,6
Wheal Leisure.....	by Truran	61,8
Pembroke.....	by Sims	60,6
East Crinnes	by ditto	59,7
Binner Downs.....	by Gregor	59,3

Consolidated Mines	by Hocking and Loam	58,2
Marazion Mines	by Grose	58,5
Binner Downs	by Gregor	56,8
Polladdras	by Richards.	56,5

In 1833, 56 engines reported ; average duty....46,6

No remarkable improvement took place in this year ; but the engines in general maintained their standing of last year. The average duty of the best engine was 84,4 millions ; and the following were reported above 55 millions at the end of the year.

Wheal Vor engine	by Richards	85,3
Wheal Darlington	by Eustis	76,3
Consolidated Mines	by Hocking and Loam	71,4
Wheal Towan	by Grose	66,7
Wheal Leisure	by Truran	64,6
Polgoooth	by Sims	63,8
Wheal Towan	by Grose	63,3
Great Work	by Richards	61,6
Consolidated Mines	by Hocking and Loam	59,2
East Crinnes	by Sims	59,2
Ding-Dong	by Bolitho	59,2
Consolidated Mines	by Hocking and Loam	58,8
Ditto	by ditto	58,6
Wheal Leisure	by Truran	58,5
Binner Downs	by Gregor	58,3
Ditto	by ditto	57,8
Wheal Vor	by Richards	57,7
Consolidated Mines	by Hocking and Loam	56,5

In 1834, 52 engines reported ; average duty47,8

The average duty of the best engines this year was 90,9 millions : and, like the year 1827, it may be regarded as an important epoch in the history of the Steam Engine. Mr. William West had erected a new

80-inch cylinder engine at Fowey Consols Mine; in constructing which he had availed himself of all the improvements that had been made for some years: and as he had filled the situation of deputy-engineer at Wheal Towan, at the time when Captain Grose was so successfully carrying to perfection his views on the subject, he was enabled to construct a machine which exceeded any hitherto known. Austen's engine was reported for the first time in July this year: its average duty for that month was 90 millions; and for the following September 97,856,382. This created great astonishment among the miners and engineers of other mines; accompanied with suspicions, which were openly declared, that some deception had been practised to cause the appearance of such extraordinary performance: and the adventurers were called upon to submit the engine to a trial before disinterested and unprejudiced men, who should either verify or disprove the statement. Mr. Austen, the principal proprietor of Fowey Consols Mine, immediately responded to the call; and October 22nd was fixed for the trial to begin. In the mean time letters were addressed to gentlemen of science and influence, and to the adventurers, chief managers, agents, and engineers of other mines, inviting them to attend the trial. On the appointed day many attended accordingly; and after a patient and scrupulous investigation, through that day and the following, they found the duty performed by the engine to be 125 millions.

As a proof of the care with which the investigation was conducted, we insert the following statement, which was published at the time.

Experimental trial of Austen's Steam Engine, of 80-inches Cylinder, at the Fowey Consols and Lanescot Mines, October 22nd and 23rd, 1835.

This celebrated engine, from its extraordinary and unprecedented power and astonishing rate of duty, having caused several engineers and others to express doubts respecting the truth of the reports, as published by Mr. Lean in his monthly lists,—the engineers, Mr. WILLIAM PETHERICK and Mr. WILLIAM WEST, at the suggestion of some scientific gentlemen of the county, and with the sanction and authority of the adventurers of those mines, have subjected her to a public trial.

A public meeting for that purpose took place at the above mines, at noon, on thursday the 22nd instant, when J. S. ENYS, Esq., of ENYS, was requested by the meeting to nominate competent persons, totally unconnected with the mines, as a committee, for the purpose of conducting the examination, in conformity with the general usage on such occasions.

The following persons were then appointed for that purpose:—

Mr. SAMUEL LYLE,	Mr. WILLIAM RENFRY,
Mr. THOMAS PETHERICK,	Mr. JAMES THOMAS,
Mr. JOHN BUDGE,	Mr. JOSEPH MORCOM, Jr.
Mr. JOHN BRAY,	

Who undertook the duty and made the following report.

We, the undersigned, having been appointed a committee to conduct the trial of Austen's engine, make the following report of our proceedings, and the result of the experiment.

Statement of proceedings.

1st—The coal-sheds carefully examined and found to be quite empty.

2nd—Twenty-eight bushels of coal measured in the presence of the committee and others.

3rd—A bushel of coal weighed, and found to be 94lbs.

4th—The coal-shed door immediately locked, the key kept by the committee and the door sealed.

5th—The committee's counter at starting registered 00,000,660, and Mr. Lean, the reporter's counter, 02,187,480. The counters locked and sealed as soon as their state was ascertained, and the keys delivered to the chairman of the committee.

6th—Quantity of grease delivered for the consumption of the engine 12lbs, and oil 1 quart.

7th—State of the fires strictly examined.

8th—Water in the boilers found to be at the regular working gauge.

9th—Steam gauge at starting $36\frac{1}{2}$.

10th—Stroke in the shaft 9 feet 3 inches.

The trial commenced on Thursday, at 28 minutes after 1 o'clock, P. M.

During the trial, which lasted 24 hours and 27 minutes, the steam gauge fluctuated between $36\frac{1}{2}$ and 45, shewing a pressure of from $36\frac{1}{2}$ to 45 lbs. on every square inch of the boilers; and the length of the stroke in the Shaft ranged from 9 feet 3 inches, to 9 feet 5 inches, but the duty has been calculated at the minimum of 9 feet 3 inches.

The exact quantity of coal consumed was 24 bushels.

On unlocking and unsealing the counters in the presence of every member of the committee, their respective states were found to be as follows, viz :—

Committee's counter registered 6947

Mr. Lean, the reporter's counter, registered 2193767

Shewing that the engine made 6287 strokes, which is found to be 4,29 strokes per minute.

The working of the Lilly lift was suspended, in con-

sequence of the prang of the bucket breaking, and this lift remained idle from 40 minutes past seven o'clock in the evening, to 23 minutes past ten o'clock at night, being 2 hours and 43 minutes, for which stoppage, 3 hours has been allowed in the calculation of duty.

The steam gauge at the termination of the trial stood at 44, being $7\frac{1}{2}$ more than at the beginning.

Calculation.

	fms.	feet	ins.	lbs.
Tye, Rose, & Crown lifts, 97	3	and 15	box	44870,96
Lilly lift	20	3	and 10 $\frac{1}{4}$	box 4405,34
Puppy lift	13	3	and 10 $\frac{1}{4}$	box 2901,06
				<hr/>
				52177,36
Deduct for Lilly lift being idle $\frac{1}{8}$ of the whole time of working			{	551,00
				<hr/>
				51626,36

Deduct for Lilly lift being idle $\frac{1}{8}$ of the whole time of working

Duty, 125,095,713 lbs. lifted one foot high by a bushel of coal.

Four bushels of coal remained unconsumed at the conclusion of the experiment, making the whole consumption 24 bushels.

At the time the engine stopped, the fires were in equally as good, if not better, condition, than at the commencement of the investigation.

The water in the boilers was higher at the conclusion than at the commencement of the experiment.

(Signed)

JOHN BUDGE, Chairman.

SAMUEL LYLE,	|	JAMES THOMAS,
THOMAS PETHERICK,		WILLIAM REMFRY,
JOHN BRAY,		JOSEPH MORCOM, JUN.

Pitmen appointed by the committee for examining the pump work.

John Pascoe, from Herland Mines.

Mark James, from Tamar Consols,

Samuel Secomb, from Holmbush Mines.

Samuel Henwood, from Holmbush Mines.

Richard Bennett, from Yalletort Consols,

Thomas Rodda, from the Tavistock mining company.

A circumstance of this nature was eminently calculated to excite the energies of the engineers throughout the county ; and it appears that many exerted themselves to the utmost to raise their engines to a level with that at Fowey Consols : for a rapid advance in the duty of several engines became apparent.

In the month of November this year the following engines were reported above 60 millions ; which now began to be considered the medium duty of a first-rate engine.

	Millions.	
Fowey Consols	by W. West.....	88,2
Wheal Vor.....	by Richards	83,9
Wheal Darlington	by Eustis	76,5
Consolidated Mines	by Hocking and Loam	73,2
Polgoooth.....	by Sims	69,0
Great Work.....	by Richards	69,0
Consolidated Mines	by Hocking and Loam	67,7
United Mines	by ditto	65,3
North Roskear	by J. West	63,0
Wheal Vor	by Richards	61,7

In 1835, 51 engines reported ; average duty

Average duty of the best engine

This year was remarkable for a great improvement which took place in the construction of rotative engines employed in stamping ores. Hitherto the reported duty of these engines rarely exceeded 25 millions ; and their average duty was below 20 millions. But in this year

Mr. Sims erected a stamping engine, working single, on the expansive principle, at Charlestown United Mines, which was first reported in October month, and found to perform the duty of 43,9 millions. Although, from the irregularity which unavoidably attends the height to which the lifters are raised, it would be incorrect to compare the duty of these engines with that performed by engines employed in pumping water alone; yet we may, without danger of error, compare engines of the same kind among themselves; whether pumping, stamping, or drawing stuff; seeing that similar circumstances attend each. Several engines of this last description (that is, Steam-whims) advanced also considerably in their duty about this time; especially at the Consolidated Mines; where some performed 19 millions and upwards; although, owing to the disadvantages under which they labour, they had, before this time, rarely exceeded 10 millions.

Millions.

The following engines were reported above 60,0 in October this year.

Fowey Consols engine	by W. West	93,1
Consolidated Mines	by Hocking and Loam	76,1
Polgoooth.	by Sims	73,8
Consolidated Mines	by Hocking and Loam	73,1
United Mines.	by ditto	71,4
Ditto	by ditto	71,1
Wheal Darlington.	by Eustis.	69,2
Marazion Mines	by Grose	65,8
Wheal Tolgus	by Michell	62,6
Consolidated Mines.	by Hocking and Loam	60,6
Wheal Leisure.	by Truran	60,1

We subjoin a Table of the work performed by the pumping engines in this year.

TABLE IV.—Shewing the work performed by the pumping engines reported in 1835.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL BEAUCHAMP, <i>Western.</i>	January	16,2	682	162330	6 0	22042	30,034,868	3.75	
	February	..	743	186650	..	..	32,106,312	4.15	
	March	..	796	—	..	..	—	—	Diameter of the cylinder, 36 inches; length of the stroke, 7 feet 9 ins.; working single.
	April	..	832	—	..	..	—	—	Hocking & Loam, Engineers.
	May	..	936	208250	..	22408	28,435,469	4.13	
	June	16,4	646	169150	..	..	33,896,246	4.35	
	July	..	644	161480	..	..	32,459,736	4.15	
	August	..	804	197970	..	..	31,875,386	3.8	
	September	14.5	540	136870	..	19078	28,971,002	2.96	
	October	..	632	158060	..	..	28,627,867	3.54	
	November	..	800	214500	..	..	30,691,732	5.1	
	December	..	864	221950	..	..	29,405,292	6.5	
	<i>Total</i>		8915				<i>Average</i>	30,650,390	4.14
WHEAL BEAUCHAMP, <i>Eastern.</i>	January	8.95	404	225990	6 0	12144	40,758,750	5.23	
	February	9.1	604	261730	..	12406	38,655,028	5.68	
	March	9.24	628	271980	..	12537	38,747,877	6.74	
	April	..	604	323020	..	..	40,228,825	7.0	
	May	..	616	299490	..	..	36,571,812	5.65	
	June	10.48	490	212940	..	14218	37,072,419	5.47	
	July	..	512	227110	..	..	37,840,429	5.84	
	August	10.3	596	248680	..	14677	36,743,721	4.8	
	September	10.97	520	210280	..	14873	36,086,474	4.56	
	October	11.1	512	199940	..	15069	35,307,373	4.48	
	November	11.4	572	242270	..	15462	39,293,483	5.8	
	December	..	736	297780	..	..	37,534,845	7.38	
	<i>Total</i>		6594				<i>Average</i>	37,903,419	5.72

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in pumps.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.	
								Feet. lbs	Load in pounds.
BALLASWIDDEN.	January	7.84	94	133860	6 0	4138	35,569,000	3,2	
	February	..	116	180370	..	..	38,605,309	4,04	
	March	..	118	157350	..	..	33,076,998	4,04	Diameter of the cylinder, 24 inches; length of the stroke, 7 feet; working single.
	April	..	152	210410	..	..	34,368,812	4,4	
	May	..	177	257020	..	..	36,052,500	4,35	
	June	..	107	136070	..	..	31,573,326	3,63	
	July	8.87	131	150280	..	4678	32,198,923	3,48	
	August	..	121	128690	..	..	29,851,925	3,08	
	September	9.0	111	123960	..	4780	32,028,583	3,1	
	October	..	146	150520	..	..	29,567,901	2,99	
	November	..	134	201710	..	..	43,171,961	5,0	
	December	..	118	165610	..	..	40,251,650	3,96	
<i>Total</i>		1525				<i>Average</i>	34,693,065	3,77	
BINNER DOWNS, <i>Treasury.</i>	January	14.6	905	166660	8 0	34603	50,978,439	4,13	
	February	..	1201	223630	..	..	51,545,504	4,85	
	March	..	1170	222580	..	..	52,662,808	5,7	
	April	14.16	1492	287830	..	33567	51,804,770	6,44	
	May	..	1544	289430	..	..	55,338,325	5,58	
	June	..	1054	199630	..	..	50,861,329	4,95	
	July	..	912	173780	..	..	51,169,063	4,3	
	August	..	978	189180	..	..	51,944,417	3,86	
	September	..	808	156390	..	..	51,975,674	3,8	
	October	..	982	201060	..	..	54,981,515	4,0	
	November	..	1114	219500	..	..	52,911,716	4,76	
	December	..	1719	288390	..	..	45,051,249	6,9	
<i>Total</i>		13879				<i>Average</i>	51,768,734	4,94	

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
BINNER DOWNS, <i>Gregor's.</i>	January	17.6	14863	2688860	7	29570	39,719,554	6,65	Diameter of the cylinder, 42 inches; length of the stroke, 9 feet; working single. Gregor & Thomas, Engineers.
	February	..	1867	324200	..	..	38,149,501	7,0
	March	..	1784	313860	..	..	38,651,049	8,07
	April	..	2128	384020	..	..	39,646,275	8,6
	May	..	2168	391910	..	..	39,852,429	7,58
	June	..	1671	296100	41,407,822	7,3	Drawing from 145 fins, below the adit, and discharging therein the water of an 11-inch pump, 7 ft. 6 ins. stroke = 33,36 gallons; average 254,46 gallons per minute.
	July	..	1636	291040	..	..	39,107,053	7,03
	August	..	1748	318900	..	..	40,080,512	6,5
	September	15.2	1374	276660	..	26280	38,176,663	6,4	
	October	..	1796	364360	38,464,730	7,2	Drawing from 60 fathoms below the adit, and discharging therein the water of a 7 ins. pump, 5 feet 3 inches stroke = 8,77 gallons; average 90,85 gallons per minute.
	November	15.34	1954	407250	..	25502	39,863,188	8,84	
	December	..	1954	434430	..	..	42,523,671	10,4
	<i>Total</i>	<i>21463</i>				<i>Average</i>	<i>39,553,537</i>	<i>7,63</i>	
BINNER DOWNS, <i>Penny.</i>	January	18.56	529	448700	5	3	8386	37,343,460	11,13
	February	..	681	591860	38,263,618	12,84	Diameter of the cylinder 24 inches; length of the stroke 5 ft. 3 ins.; working single. Gregor & Thomas, Engineers.
	March	..	761	682760	..	..	40,026,009	15,75
	April	..	746	682220	..	..	40,262,411	15,28
	May	19.44	334	212620	..	8787	29,366,864	4,1	
	June	20.4	197	123650	..	9339	31,520,902	3,1	
	<i>Total</i>	<i>3238</i>				<i>Average</i>	<i>36,130,544</i>	<i>10,36</i>	

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
BINNER DOWNS <i>Burn's.</i>	July	7.47	1421	276950	7 9	28915	43,674,927	6.87	Gregor & Thomas, Engineers.
	August	8.58	1513	283290	..	33224	48,210,977	5.78	Drawing from 83 fathoms below the adit; and discharging therein the water of a 15 $\frac{1}{4}$ in. pump, 7 ft. 9 ins. stroke, = 61.44 gallons; average 334.23 gallons per minute.
	September	9.9	1199	176240	..	38573	43,941,049	4.37	W. Treasury 468.17
	October	10.6	1407	187110	..	41086	42,344,842	3.7	Gregor's 254.46
	November	10.9	1533	227670	..	42523	48,942,849	4.94	Total 1056.86 gallons.
	December	..	1910	297850	51,391.327	7.1	
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BURN'S.									
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TABLE IV.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
CONSOLIDATED MINES, <i>Taylor's.</i>	January	11,36	3617	361940	7	87329	60,650,520	7,39	Diameter of the cylinder, 66 inches; length of the stroke 10 ft. 4 ins.; working single. Hocking & Loan Engineers.
	February	11,78	2986	294980	9	88216	67,533,986	7,3	
	March	..	2987	290450	..	..	67,610,865	7,2	
	April	11,65	3163	322110	..	89496	70,633,437	7,45	
	May	..	3240	131700	..	..	69,201,765	7,03	
	June	..	2495	265540	..	..	73,786,146	6,8	
	July	..	2598	271070	..	..	72,368,177	6,5	
	August	..	3089	322140	..	..	72,332,266	6,39	
	September	12,2	2944	312250	..	94054	77,311,413	6,37	
	October	..	2669	278870	..	..	76,160,922	6,45	
	November	..	2609	267030	..	..	74,604,487	6,87	
	December	..	3047	305880	..	..	73,174,135	7,08	
		<i>Total</i>	34594	324630	8	<i>Average</i>	71,281,509	6,9	
CONSOLIDATED MINES, <i>Davey's.</i>	January	11,0	2830	264320	9	71758	72,024,556	6,63	
	February	..	2419	264320	..	71908	68,881,116	6,57	
	March	11,14	2337	263410	..	72547	71,548,586	6,53	
	April	..	2474	286910	..	..	73,616,217	6,64	
	May	11,36	2832	337340	..	73946	77,072,124	6,88	
	June	..	2261	261600	..	74253	75,172,541	6,7	
	July	11,45	2323	256700	..	74580	72,092,587	6,16	
	August	..	2490	309370	..	74866	81,390,090	6,13	
	September	11,78	2898	3255340	..	76706	75,322,831	6,6	
	October	11,85	2442	264580	..	77148	73,132,639	6,12	
	November	..	2199	248460	..	..	76,271,786	6,39	
	December	..	2471	267260	..	..	73,011,949	6,18	
		<i>Total</i>	29977			<i>Average</i>	74,128,988	6,46	

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in pumps.	Load in pounds.	Feet. <i>feet.</i>	Pounds lifted one foot high, by counteracting a bucket of coal.	Number of strokes per minute.	REMARKS.
CONSOLIDATED MINES, <i>Pearce's.</i>	January	16,1	1212	134360	7 6	64100		53,295,024	2,74	
	February	..	1073	107310	..	..		48,079,480	2,66	
	March	..	1041	109880	..	..		50,744,293	2,72	Diameter of the cylinder, 65 inches; length of the stroke, 9 feet; working single.
	April	..	1138	129350	..	..		62,497,816	2,99	Hocking & Loam, Engineers.
	May	..	1063	140210	..	..		63,411,060	2,86	
	June	..	1000	100480	..	..		—	2,68	
	July	..	1045	105930	..	..		48,858,311	2,54	Drawing from 262 fathoms below the adit; and discharging therein the water of an 11 ft. pump, 7 feet 6 ins. stroke = 31,64 gallons; average 81,94 gallons per minute.
	August	..	1274	124330	..	..		47,037,288	2,46	
	September	16,4	1152	109060	..	65393		46,430,732	2,2	
	October	..	928	91660	..	..		48,442,260	2,12	
	November	..	1024	98450	..	65566		47,757,851	2,55	
	December	..	1231	127580	..	..		50,968,110	2,96	
<i>Total</i>		13182	..	..				<i>Average</i>	51,502,020	2,59
CONSOLIDATED MINES, <i>Woolf's.</i>	January	11,25	4183	300360	7 6	95406		51,379,654	6,13	
	February	..	2940	240320	..	..		58,489,719	5,96	
	March	11,53	2930	238170	..	97823		59,837,808	5,9	
	April	..	3417	288220	..	..		61,884,427	6,67	
	May	..	3816	303440	..	..		68,355,329	6,2	
	June	..	3085	241560	..	..		57,447,626	6,2	
	July	..	3324	252440	..	..		55,718,496	6,04	
	August	..	4255	317710	..	..		54,731,454	6,3	
	September	11,6	3974	304190	..	98565		56,584,966	6,2	
	October	..	3534	262630	..	..		54,936,600	6,07	
	November	..	3591	239230	..	..		49,266,031	6,16	
	December	..	4138	284540	..	..		50,881,957	6,58	
<i>Total</i>		43186	..	..				<i>Average</i>	55,776,172	6,2

TABLE IV.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load, in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
CONSOLIDATED MINE S., <i>Bawden's.</i>	January	8.3	38558	342310	7 6	73259	46,820,541	7,0	
	February	..	3098	283170	..	..	48,246,387	7,0	
	March	..	3091	285520	..	..	48,858,005	7,07	
	April	..	3204	284030	..	..	46,888,835	6,57	
	May	..	3556	334940	..	..	49,819,970	6,86	Hocking & Loam, Engineers.
	June	..	2961	271170	..	..	48,439,698	6,97	
	July	..	3117	288080	..	..	48,884,874	6,9	Drawing from 205 fms. below the adit; and discharging therein the water of a 13 ins. pump, 7 ft. 6 ins. stroke, =43.2 galls; average 298,08 gallons per minute.
	August	..	3860	341870	..	..	46,777,413	6,77	
	September	..	4015	343380	..	..	45,236,359	7,0	
	October	..	3249	285670	..	..	46,507,102	6,6	
	November	..	3016	269160	..	..	47,204,515	6,9	
	December	..	3281	308850	..	..	49,790,413	7,15	
	<i>Total</i>	40306				<i>Average</i>	47,807,014	6,9	
CONSOLIDATED MINE S., <i>Shears's.</i>	January	12.76	1040	161260	7 6	50884	59,151,408	3,29	
	February	..	854	137930	..	..	61,613,040	3,4	
	March	..	849	142840	..	..	64,182,100	3,54	
	April	..	1004	165670	..	..	62,947,989	3,83	
	May	..	1125	183320	..	..	62,162,589	3,74	
	June	..	910	136940	..	..	57,406,451	3,5	
	July	..	853	139420	..	..	62,351,631	3,3	
	August	..	1009	160760	..	..	60,779,707	3,19	
	September	..	932	145190	..	..	59,428,198	2,96	
	October	..	821	130480	..	..	60,629,097	3,02	
	November	..	742	121580	..	..	62,507,194	3,1	
	December	..	878	138420	..	..	60,141,755	3,2	
	<i>Total</i>	11017				<i>Average</i>	61,108,450	3,34	
	<i>Total</i>	11017							Total 143,16 gallons from the Consolidated Mines per minute.

Taylor's, 308.01

Davey's,

260.51

Pearce's,

81.94

W. Wolf's,

319.62

Bawden's,

268.8

Shear's,

144.28

TABLE IV.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
DOLCOATH,	January	12,2	1836	164770	7 6	66494	44,755,785	3,8	Diameter of the cylinder, 76 inches; length of the stroke, 9 feet; Jeffree, Engineer.
	February	..	2268	202210	..	..	44,463,464	4,4
	March	..	2286	211470	..	..	46,133,484	5,24
	April	..	2430	227620	..	..	46,714,087	5,1
	May	..	2664	253880	..	..	47,526,736	4,76
	June	..	1566	140440	..	..	44,724,221	4,08
	July	..	1908	164030	..	..	42,973,469	3,86
	August	..	1998	180250	..	..	44,990,778	3,8
	September	..	1386	137120	..	..	49,337,972	3,4
	October	..	1728	144800	..	..	41,789,631	3,7
	November	11,77	2376	211700	..	64075	42,817,795	4,1	
	December	11,3	3240	309830	..	61513	44,117,063	7,4	
	Total	256886	..	..	Average	45,020,374	4,45	..
WHEAL DAMSEL, Stephens's.	January	12,08	824	114930	7 3	31046	30,874,814	2,75	Diameter of the cylinder, 50 inches; length of the stroke, 9 ft. 4 ins.; working single. Sims, Engineer.
	February	..	840	—	..	..	—	—
	March	..	720	—	..	..	—	—
	April	12,0	824	125150	..	30820	33,405,765	2,8	
	May	..	912	141710	..	..	34,183,429	2,89
	June	..	716	112160	..	..	34,454,267	2,88
	July	..	732	121570	..	..	36,528,629	3,0
	August	12,2	794	146800	..	30905	40,763,485	2,8	
	September	12,56	858	141710	..	32465	38,025,227	3,07	
	October	..	824	129970	..	32542	36,389,943	2,9	
	November	12,6	752	116650	..	32712	35,952,398	2,8	
	December	..	732	116660	..	32763	36,988,670	2,9	
	Total	9528	..	..	Average	35,756,864	2,88	..

TABLE IV.—Continued.

ENGINES.	Mouths.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL DARLINGTON.	12,4	2124	274580	8 0	78084	80,754,443	6,15	Diameter of the cylinder, 80 inches; length of the stroke, 10 feet; working single. Eustis, Engineer.	
	January	2196	283710	..	..	80,703,867	6,15	
	February	2094	254530	..	..	76,049,490	6,55	
	March	2562	3254280	..	..	79,310,424	7,29	
	April	3120	382010	..	..	76,484,279	7,16	
	May	2290	275790	..	..	75,230,694	6,8	
	June	2222	260990	..	..	73,372,252	6,47	
	July	2348	278740	..	..	74,157,186	6,24	
	August	12,8	2278	251340	..	80765	71,288,762		
	September	12,9	2810	300270	..	81060	69,295,049		
	October	2386	264900	..	..	71,995,956	5,8	
	November	2698	303320	..	..	72,958,810	6,57	
	December	..	Total	29126	..	<i>Average</i>	75,133,434	6,55	
DING-DONG.	10,0	185	118810	6 0	7070	27,242,811	2,84	Diameter of the cylinder, 30 inches; length of the stroke, 6 feet; working single. Bolitho, Engineer.	
	January	9,2	182	170340	..	6497	36,484,581	3,8	
	February	10,0	147	130660	..	7070	37,704,743	3,34	
	March	..	187	180580	..	..	29,621,409	2,75
	April	..	170	176080	..	..	<u>3,0</u>	<u>3,0</u>
	May	11,5	157	126850	..	8174	39,625,677	3,38	
	June	18,1	450	369500	..	9624	31,616,062	3,55	
	July	11,26	216	140750	..	7954	31,007,930	3,37	
	August	..	206	148250	..	..	34,345,063	3,8
	September	..	278	218000	..	..	37,423,856	4,3
	October	..	379	234520	..	..	32,454,879	5,8
	November	..	295	163410	..	..	26,435,860	2,9
	December	..	Total	2852	..	<i>Average</i>	33,096,624	3,98	

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
EAST CRINNES, <i>Hudson's.</i>	January	12.9	1884	204380	7 3	83375	65,573,950	4.18	
	February	..	1664	155040	..	..	56,320,213	3.84	
	March	..	1720	174100	..	..	61,184,889	4.3	Diameter of the cylinder, 76
	April	..	2756	282770	..	..	62,018,458	5.4	inches; length of the stroke, 10 ft. 4 ins.; working single.
	May	..	1656	178020	..	..	65,345,407	5.8	Sims, Engineer.
	June	..	2752	267720	..	..	58,803,914	4.89	
	July	..	1968	192230	..	..	59,043,205	4.6	Drawing from 126 fms. below
	August	..	1986	194810	..	..	59,293,331	4.36	the adit; and discharging
	September	..	1536	140590	..	..	55,326,993	4.06	therein the water of a 19
	October	..	1438	135660	..	..	57,025,195	4.1	inch pump, 7 feet 3 inches
	November	..	3934	371130	..	..	57,946,949	5.89	stroke, —50.97 gallons; average 390.74 gallons, per minute.
	December	..	3432	320560	..	..	56,459,353	7.95	
	<i>Total</i>	<i>26726</i>				<i>Average</i>	<i>59,528,571</i>	<i>4.88</i>	
EAST CRINNES, <i>Rundle's.</i>	January	19.9	808	157310	7 3	33724	47,610,733	3.2	
	February	20.5	780	160510	..	34747	48,610,050	3.7	
	March	15.48	652	184420	..	26216	53,760,692	4.57	Diameter of the cylinder, 41
	April	15.5	912	268600	..	26930	57,288,816	5.18	inches; length of the stroke, 9 ft. 4 ins.; working single.
	May	16.0	724	200280	..	27136	54,423,047	5.76	Sims, Engineer.
	June	16.2	1104	287310	..	27443	51,778,714	5.25	
	July	..	832	199490	..	..	47,705,384	4.77	Drawing from 122 fms. be-
	August	..	744	209420	..	..	56,063,463	4.7	low the adit; and discharging
	September	..	660	159330	..	..	48,031,175	4.6	therein the water of an 11
	October	..	576	140260	..	..	48,448,567	4.23	inch pump, 7 ft. 3 ins. stroke, —29.9 gallons; average 150.69
	November	..	1678	403060	..	..	47,791,134	6.08	gallons per minute.
	December	16.0	1452	341410	..	27138	46,262,113	8.46	Hudson's ... 390.74
	<i>Total</i>	<i>10922</i>				<i>Average</i>	<i>50,643,323</i>	<i>5.04</i>	Rundle's ... 160.69
									Total <u>541.43</u> gallons per minute from East Crinnes

TABLE IV.—Continued.

ENGINES.	Mouths.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Feet, fms.	Pounds lifted, one foot high, by coal, amounting a bushel of coal.	Number of strokes, per minute.	REMARKS.
FOWEY CONSOLS, <i>Austen's.</i>	January	8,67	712	146700	9	48680	9	92,777,448	3,08	
	February	8,73	688	139620	..	48895	91,764,889	3,84		
	March	8,79	772	158610	..	49192	93,486,624	3,0	Diameter of the cylinder, 80 inches; length of the stroke, 10 ft. 4 in.; working single.	
	April	8,84	936	187990	..	49499	91,959,598	3,73		
	May	8,99	643	130280	..	50316	94,300,635	3,48		
	June	9,0	896	161620	..	50624	84,466,652	3,12		
	July	9,1	710	128130	..	50930	85,017,413	2,97		
	August	..	658	128980	..	51135	92,716,381	2,88	Drawing from 134 fms. below the adit, and discharging therein the water of a 16 inch pump, 9 feet 3 inches stroke, =70,94 gallons; average 237,6 gallons per minute.	
	September	..	504	97310	..	..	91,324,421	2,8	
	October	..	454	87640	..	52177	93,163,124	2,9		
	November	9,4	1340	262950	..	52760	96,706,782	3,88		
	December	..	940	179740	..	..	93,317,566	4,16	
		<i>Total</i>	9253			<i>Average</i>	91,672,210	3,35		
GREAT WORK, <i>Breage.</i>	January	10,25	1404	231700	7	0	37321	43,113,197	6,74	
	February	..	1602	246040	..	..	39,960,028	6,07	
	March	..	1720	279360	..	..	42,481,373	5,64	
	April	10,64	1440	213820	..	37413	38,837,176	5,3		
	May	..	1530	241180	..	..	41,282,921	4,78	
	June	..	1206	187410	..	..	40,697,840	4,66	
	July	11,87	1188	1865860	..	43165	54,714,318	4,6		
	August	..	1530	238880	..	..	45,200,808	4,54	
	September	..	1296	182480	..	..	42,544,170	4,5	
	October	..	1242	179600	..	..	43,693,287	4,45	
	November	..	1648	226380	..	..	44,187,240	4,49	
	December	..	1134	167640	..	..	44,637,781	4,65	
		<i>Total</i>	16840			<i>Average</i>	42,817,551	4,94		

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch on the piston	Consumption of coal in bushels.	Length of the stroke, in the pumps.	Number of strokes.	Load in pounds.	Length of the stroke, in the pumps.	Number of strokes per minute.	REMARKS.
GREAT WORK, <i>Leeds'.</i>	January	11,42	1206	297730	7	0	26890	63,609,965	7,38
	February	..	1242	321260	..	..	37088	66,794,661	7,36
	March	11,48	1098	290390	..	..	68,661,102	5,75	
	April	..	828	211940	..	..	68,449,333	5,2	Richards, Engineer.
	May	11,5	936	240390	..	..	67,025,149	4,77	
	June	..	756	181640	..	..	62,702,800	4,5	
	July	11,6	720	175010	..	..	37478	63,768,293	4,34
	August	..	936	222090	..	..	62,248,315	4,4	
	September	11,66	702	173980	..	..	37675	65,360,221	4,3
	October	11,68	738	175300	..	..	37762	62,788,279	4,34
	November	..	900	234980	..	..	69,014,670	4,615	Breag'... 169,73 Leeds' ... 124,07
	December	..	738	162800	..	..	65,474,600	5,08	Total <u>293,8</u> gallons. per minute from Great Work Mine.
	<i>Total</i>	<u>10,84</u>	<u>10800</u>	<u>6</u>	<u>6</u>	<u>Average</u>	<u>65,324,782</u>	<u>5,2</u>	
GREAT St. GEORGE, <i>North.</i>	January	1818	167590	6	6	47185	28,272,976	3,5	
	February	..	1494	149020	..	..	31,194,649	3,7	
	March	..	1656	160680	..	..	29,759,032	4,0	
	April	..	1404	152200	..	..	33,247,949	3,77	
	May	..	1638	176470	..	..	33,042,606	3,6	
	June	..	1224	143160	..	..	35,872,164	3,2	
	July	..	1512	144700	..	..	29,351,753	3,35	
	August	..	1296	143310	..	..	33,914,764	3,32	
	September	..	1242	134080	..	..	33,110,041	3,3	
	October	..	1206	114950	..	..	29,233,376	3,3	
	November	..	2214	243960	..	..	33,795,457	4,03	
	December	..	1854	188650	..	..	31,207,889	4,1	
	<i>Total</i>	<u>18558</u>	<u>Average</u>	<u>31,833,554</u>	<u>3,6</u>				

TABLE IV.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
GREAT St. GEORGE, South.	January	15.74	508	127950	7	23730	44,826,577	2,69	Diameter of the cylinder, 40 inches; length of the stroke, 9 feet; working single.
	February	16.5	476	110730	6	24958	43,544,107	2.74	Grose and West, Engineers.
	March	..	472	121040	..	..	48,001,848	3.0	
	April	..	426	138220	..	..	60,734,062	3.4	
	May	17.0	512	149720	..	25690	56,342,384	3.06	Drawing from 86 fins, below the adit; and discharging therein the water of a 12 inch pump, 7 feet 6 inches stroke, =36.81 gallons; average 110.62 gallons per minute.
	June	..	462	127840	..	..	53,315,090	2.86	
	July	17.38	404	111880	..	26208	54,059,640	2.59	
	August	17.76	420	114800	..	26726	54,788,300	2.66	
	September	..	440	117460	..	..	53,509,409	2.9	
	October	..	402	97220	..	..	48,475,778	2.9	
	November	..	817	204100	..	..	50,074,448	3.4	
	December	..	678	174580	..	..	51,613,109	3.78	Total 341,112 gallons per minute from Great Saint George Eastern Mine.
	Total	6017	..	..	..	Average	51,607,062	2.99	
GREAT St. GEORGE, Devonshire's.	January	9.6	1782	172650	7	6	49356	35,864,113	3.63
	February	..	1404	134350	..	..	35,421,894	3.33	Diameter of the cylinder, 70 inches; length of the stroke, 10 feet; working single.
	March	..	1260	133210	..	..	39,135,195	3.3	
	April	..	1350	137120	..	..	37,588,304	3.4	
	May	..	1710	172840	..	..	37,415,311	3.53	
	June	..	1440	149480	..	..	38,425,702	3.35	
	July	..	1584	159770	..	..	37,337,159	3.69	
	August	..	1242	130790	..	..	38,980,381	3.02	
	September	..	1512	144290	..	..	35,325,283	3.57	
	October	..	1134	115800	..	..	37,800,428	2.5	
	November	..	2394	216230	..	..	33,438,119	3.58	
	December	..	1818	185740	..	..	37,819,238	4.03	
	Total	18630	..	..	..	Average	37,046,760	3.41	

TABLE IV.—Continued.

ENGINES	Mouths.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL JEWELL.	January	10.14	336	63:90	6	17148	19,502,787	1.5	
	February	10.0	370	92190	0	16987	25,395,105	2.0	
	March	10.26	403	114350	..	17362	29,558,481	2.83	Diameter of the cylinder, 39 inches; length of the stroke, 8 feet 6 ins.; working single.
	April	10.5	406	107610	..	17794	29,297,719	2.4	
	May	..	442	107080	..	..	26,864,907	1.89	Sims, Engineer.
	June	..	338	84390	..	1744	26,658,254	2.16	
	July	11.0	350	92780	..	18748	29,818,961	2.3	
	August	..	396	103450	..	..	29,386,069	2.0	
	September	11.3	384	88270	..	19190	26,467,207	1.9	
	October	..	410	114069	..	..	32,031,386	2.65	
	November	..	510	141810	..	..	32,015,692	3.4	
	December	11.6	690	172980	..	19650	34,167,420	4.3	
	Total	4946	..	..	..	Average	28,330,165	2.4	
LANESCOT, Sawle's.	January	13.14	272	214350	5	9182	39,797,387	4.5	
	February	..	290	222610	..	..	38,765,612	5.33	
	March	..	302	246570	..	..	41,231,892	6.1	
	April	..	364	304200	..	..	42,204,407	6.3	Diameter of the cylinder 24 inches; length of the stroke, 8 ft. 6 ins.; working single.
	May	..	270	215200	..	..	40,251,167	5.74	
	June	..	354	282110	..	..	40,245,302	5.44	
	July	..	269	211900	..	..	39,781,271	4.9	
	August	..	264	212260	..	..	46,603,569	4.75	
	September	..	222	163770	..	..	37,254,724	4.7	
	October	..	188.	134000	..	..	35,995,393	4.43	
	November	..	516	385260	..	..	37,705,456	5.69	
	December	..	432.	309440	..	..	36,173,679	7.16.	
	Total	3743	..	..	..	Average	39,167,486	5.42	

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Feet. lbs.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL LEISURE, North.	January	11.2	2200	281420	8 0	54060		5,4775,828	5,46	Diameter of the cylinder, 70 inches; length of the stroke, 10 feet; working single.
	February	..	1742	220380	..	..		60,109,178	5,8	
	March	11.36	1708	234780	..	54681		59,274,238	6,08	
	April	11.48	1828	245090	..	55262		58,925,592	6,08	
	May	..	2224	296430	..	..		55,493,175	5,64	
	June	..	2008	252050	..	56265		34,697,067	5,75	
	July	11.7	2044	248380	..	56868		65,565,590	5,85	
	August	11.82	1756	253080	..	57638		62,943,698	6,4	
	September	12.0	1892	257860	..	..		60,191,683	6,5	
	October	..	1728	225570	..	..		56,859,616	8,25	
	November	..	4046	498928	..	..		65,642,037	8,3	
	December	..	2684	382960	..	..		
		<i>Total</i>	<i>25860</i>					<i>Average</i>	<i>59,487,984</i>	<i>6,33</i>
WHEAL LEISURE, South.	January	7.5	500	84410	7 9	34292			1,77	Diameter of the cylinder, 60 inches; length of the stroke, 9 ft. 10 ins.; working single.
	February	7.53	672	112350	..	34488		42,965,593	2,8	
	March	7.6	834	148810	..	34815		45,628,740	3,68	
	April	..	1344	198850	..	34890		37,875,450	4,9	
	May	9.53	1746	193980	..	44962		35,714,428	3,96	
	June	..	1318	171040	..	..		41,717,018	3,8	
	July	..	1314	162250	..	..		39,693,585	3,75	
	August	..	1182	141440	..	..		38,466,773	3,27	
	September	..	1028	130350	..	..		40,761,383	3,23	
	October	..	912	116470	..	..		41,053,503	3,87	
	November	..	2352	321860	..	..		43,990,680	5,32	
	December	..	1936	314610	..	..		52,246,039	6,8	
		<i>Total</i>	<i>16138</i>					<i>Average</i>	<i>41,828,472</i>	<i>3,93</i>
										Total <i>707,61</i> gallons per minute from Wh. Leisure

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
LEVANT.	January	17.3	536	401140	4 0	9170	27,451,147	9,6	Diameter of the cylinder, 26 inches; length of the stroke, 4 feet; working single.
	February	18.1	480	355470	..	9626	29,754,384	7,9	
	March	15.3	354	308000	..	8128	28,287,276	7,9	
	April	18.1	494	374010	..	9626	28,917,431	7,87	
	May	..	538	422390	..	..	31,654,868	7,49	
	June	..	354	288170	..	..	31,343,778	7,7	
	July	..	450	369590	..	..	31,616,062	8,55	
	August	..	406	368250	..	..	34,943,591	8,8	
	September	17.5	254	220010	..	9170	31,771,522	9,5	
	October	..	606	457580	..	..	27,697,031	9,08	
	November	..	424	375160	..	..	32,454,879	9,3	
	December	..	450	381240	..	..	31,075,296	9,1	
		<i>Total</i>	6326	..		<i>Average</i>	30,580,605	8,57	
MARAZION MINES, Pawlet's.	January	12.66	1148	201990	8 0	40292	56,714,850	4,6	
	February	..	1054	204340	..	..	62,491,592	4,43	
	March	..	892	193030	..	..	69,753,944	4,98	
	April	..	1276	296220	..	..	74,829,443	6,88	
	May	..	1642	369100	..	..	72,456,892	6,9	
	June	..	1134	264620	..	..	75,217,418	6,56	
	July	12.84	1050	246430	..	40837	76,673,996	6,1	
	August	..	1090	252860	..	41034	76,153,080	5,88	
	September	13.0	994	224260	..	41426	74,770,179	5,36	
	October	13.1	1358	268410	..	41666	65,882,598	5,18	
	November	..	1170	219190	..	..	62,446,294	5,43	
	December	..	1738	290980	..	..	57,532,642	7,44	
		<i>Total</i>	14566	..		<i>Average</i>	68,760,243	5,76	

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
POLDICE, <i>Sims's.</i>	January	4.89	2738	313670	7 0	44500	—	7.65	Diameter of the cylinder, 90 inches; length of the stroke, 10 feet; working single.
	February	5.11	2856	307810	..	46433	—	6.68	Sims, Engineer.
	March	..	1920	197680	..	..	—	4.9	
	April	5.04	2872	431610	..	48620	51,146,987	9.84	
	May	5.62	3888	417380	..	51138	38,469,375	8.3	
	June	5.84	2320	283980	..	53126	46,483,647	7.7	
	July	..	1920	207860	..	..	40,258,163	5.15	
	August	..	2104	283500	..	..	41,279,962	4.38	
	September	..	1600	—	..	..	—	—
	October	..	2064	19560	..	..	35,775,626	4.05	
	November	..	1952	213340	..	..	40,644,111	5.49	
	December	..	2720	290930	..	..	39,776,334	7.2	
		<i>Total</i>	239952	—		<i>Average</i>	41,729,875	6.46	
PEMBROKE, <i>Pearce's.</i>	January	5.86	669	266940	7 0	14804	41,348,968	5.45	Diameter of the cylinder, 50 inches; length of the stroke, 9 feet; working single.
	February	..	521	230470	..	..	45,840,969	6.7	Sims, Engineer.
	March	..	642	296340	..	..	41,781,117	7.35	
	April	..	955	444240	..	..	46,654,767	6.57	
	May	..	642	296290	..	..	45,202,425	7.6	
	June	..	955	410570	..	..	38,883,229	6.07	
	July	..	643	253600	..	..	37,167,598	5.3	
	August	..	666	238870	..	21144	41,364,736	4.66	
	September	7.8	540	161280	..	..	43,190,655	4.78	
	October	..	508	158420	..	..	—	—
	November	..	1500	441090	..	21981	43,597,236	6.7	
	December	8.0	1006	307670	..	<i>Average</i>	42,987,012	7.63	
		<i>Total</i>	9247	—		<i>Average</i>	42,987,012	6.36	

TABLE IV.—Continued.

ENGINES.	Mo. ths.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
PEMBROKE, <i>Edgcumbe's.</i>	January	13,9	960	304290	6	24187	49,832,400	8,2	Diameter of the cylinder, 40 inches; length of the stroke, 9 feet; working single. Sims, Engineer.
	February	14,66	946	269670	6	25496	47,941,851	6,38	
	March	..	908	303100	..	..	55,320,423	7,5	
	April	..	1179	416420	..	..	58,538,323	8,1	Drawing from 148 fms. below the adit; and discharging therein the water of a 12 inch pump, 6 feet 6 inches stroke, =31.9 galls.; average 236.06 galls. per minute. Pearce's. . . 241,46 Edgcumbe's 236,06 Total 577.52 gallons per minute from Pembroke.
	May	..	721	280180	..	..	64,400,208	7,78	
	June	..	1155	425700	..	..	61,081,131	7,3	
	July	..	894	306060	..	..	58,735,444	7,3	
	August	..	982	332890	..	..	56,179,085	7,45	
	September	..	730	243810	..	..	55,349,545	7,05	
	October	..	658	231650	..	..	58,343,411	7,0	
	November	15,6	1650	505920	..	27091	53,992,855	7,6	
	December	..	1030	334500	..	..	54,039,088	8,29	
	<i>Total</i>		11873				<i>Average</i>	55,920,730	7,4
POLGOOTH.	January	8,9	1162	274570	7	4	40365	70,580,321	5,77
	February	..	1187	280020	..	..	..	70,446,251	6,7
	March	..	1448	341550	..	..	..	70,456,717	8,47
	April	9,18	1905	441920	..	..	41607	71,524,432	8,5
	May	..	1224	271460	..	..	..	68,284,585	7,64
	June	..	1594	375940	..	..	..	72,615,334	7,05
	July	..	1160	279730	..	..	..	74,247,045	6,7
	August	..	1140	280080	..	..	..	75,644,153	6,27
	September	..	862	210030	..	..	..	75,019,158	6,07
	October	..	940	225380	..	..	..	73,821,972	6,8
	November	..	3064	693690	..	..	..	69,706,743	7,47
	December	..	1568	368510	..	..	..	72,860,463	9,14
	<i>Total</i>		17254				<i>Average</i>	72,052,179	7,27

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load, in pounds.	Pounds lifted one foot high, by connecting a bucket of coal.	Number of strokes per minute.	REMARKS.
WHEAL PRUDENCE.	January	16.0	1056	283450	6 9	17761	32,185,264	5.98	
	February	..	942	240970	..	18086	30,673,025	5.97	Diameter of the cylinder, 33 inches; length of the stroke, 8 ft. 9 ins.; working single.
	March	16.3	870	240730	..	18408	33,778,814	6.96	
	April	16.6	890	254900	..	..	35,986,904	6.3	
	May	..	1170	312280	..	..	33,164,136	6.37	Grose and West, Engineers.
	June	..	930	266180	..	..	35,563,365	5.98	
	July	..	1000	273810	..	..	34,021,987	6.3	Drawing from 78 fms. below the adit; and discharging therein the water of a 94 ins. pump, 6 ft. 9 ins. stroke, =20,76 gallons; average 128.5 gallons per minute.
	August	..	1030	267810	..	..	32,307,246	6.2	
	September	..	1060	251630	..	..	20,496,258	6.02	
	October	..	730	213060	..	..	30,265,148	6.4	
	November	..	1410	386280	..	..	34,040,308	6.4	
	December	..	1130	301230	..	..	33,123,037	6.5	
<i>Total</i>		12218				<i>Average</i>	33,350,540	6.19	
WHEAL REETH, Old.	January	15.8	848	171610	7 6	18110	24,434,390	3.84	
	February	..	998	195300	..	..	23,627,973	4.1	
	March	..	1010	220930	..	..	26,411,197	5.67	Diameter of the cylinder, 36 inches; length of the stroke, 7 ft. 6 in.; working single.
	April	..	1060	210790	..	..	22,985,213	4.52	
	May	..	1292	268510	..	..	25,093,007	4.05	Eustis and Son, Engineers.
	June	..	574	115670	..	..	24,331,204	3.8	
	July	..	954	176440	..	..	22,330,756	3.8	Drawing from 160 fms. below the adit; and discharging therein the water of a 8 inch pump, 7 feet 6 inches stroke, =16.35 gallons; average 73.57 gallons per minute.
	August	..	864	161840	..	..	22,616,578	3.6	
	September	12.2	644	138450	..	14447	20,051,278	3.86	
	October	..	954	224300	..	..	21,928,851	4.47	
	November	14.7	1164	285070	..	17002	27,534,970	7.07	
	December	..	986	212310	..	..	24,209,153	5.26	
<i>Total</i>		11348				<i>Average</i>	23,788,714	4.5	

TABLE IV.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Fee. Int.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
NORTH ROSKEAR.	January	6.3	352	92170	8	30402	63,685,580	2,13		
	February	..	365	98200	..	..	65,435,099	2,13		
	March	..	324	92540	..	..	69,466,693	2,29		
	April	..	374	102790	..	..	66,845,381	2,3		
	May	..	602	160290	..	..	64,759,290	3,0		
	June	..	550	—	..	..	—		3,5	
	July	..	694	—	..	..	—		2,0	
	August	9.0	610	89730	..	44574	52,454,068	1,88		
	September	..	546	79060	..	..	51,633,999	1,96		
	October	9.3	618	80440	..	44805	46,655,200	1,55		
	November	..	558	—	..	..	—		108.74 gallons per minute.	
	December	6.3	525	130900	..	30534	61,924,182	3,18		
		<i>Total</i>	6118			<i>Average</i>	60,317,691	2,36		
SOUTH ROSKEAR, <i>Wheal Chance</i> .	January	7.0	838	204090	7	0	25476	43,431,713	4.72	
	February	..	906	221620	..	..	43,622,447	4,8		
	March	..	842	195380	..	..	41,380,648	4,84		
	April	..	1236	279000	..	..	40,254,553	6.25		
	May	..	1510	333080	..	..	39,336,968	6.25		
	June	6.55	808	219120	..	23819	45,216,008	6.34		
	July	..	1006	245840	..	..	40,745,169	5.5		
	August	..	1048	243220	..	24187	39,293,258	5.1		
	September	..	732	193810	..	24334	45,100,010	4.8		
	October	6.77	900	230700	..	24629	44,190,635	4.45		
	November	..	758	181650	..	..	41,315,309	4.68		
	December	..	948	220310	..	..	40,065,511	5.27		
		<i>Total</i>	11532			<i>Average</i>	41,996,019	5.2		

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
RELISTIAN.	January	10.13	909	144360	7	34757	40,939,082	3.58	
	February	9.6	980	168020	6	..	..	3.6	
	March	..	873	142680	..	..	44,939,960	3.7	Diameter of the cylinder, 60 inches; length of the stroke, 9 feet; working single.
	April	..	981	168850	..	32452	44,685,180	3.77	
	May	..	1125	186230	..	..	42,976,255	3.59	
	June	9.7	864	141040	..	32648	42,649,925	3.5	
	July	..	882	129563	..	..	38,386,212	3.2	
	August	9.27	765	140160	..	31470	46,126,381	3.04	
	September	..	765	131210	..	..	43,180,953	3.04	
	October	9.56	1098	188640	..	32618	44,872,267	3.2	
	November	9.73	810	129100	..	33019	42,101,263	3.44	
	December	..	999	158430	..	..	41,891,492	3.66	
	Total	11051				Average	42,975,360	3.44	
ROCHE ROCK.	January	10.5	796	421170	6	9	13433	48,331,056	8.6
	February	9.97	664	335090	..	..	12682	43,530,116	8.3
	March	..	848	390500	..	..	..	39,712,008	9.68
	April	..	1000	462030	..	..	..
	May	..	806	318600	..	..	34,088,460	8.5	
	June	13.19	750	297500	..	16584	..	5.75	
	July	14.0	581	227700	..	17762	47,335,577	5.45	
	August	..	556	220430	..	..	47,884,690	5.1	
	September	14.2	555	196130	..	18099	43,468,486	5.04	
	October	12.9	614	224610	..	16469	40,967,254	6.7	
	November	..	1642	545810	..	..	37,255,837	8.6	
	December	14.2	1014	340300	..	18089	41,280,739	7.87	
	Total	9826				Average	42,381,422	7.4	

TABLE IV.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Feet. fms.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
St. IVES CONSOLS, New.	January	9.97	850	191261	8 0	250668	—	43,911.628	4,16	Diameter of the cylinder, 50 inches; length of the stroke, 10 feet; working single. Enstis and Son, Engineers.
	February	10.14	866	191261	..	25501	—	47,489.172	4,8	
	March	9.6	793	190220	..	23555	43,527.997	4,76	4,57	
	April	..	918	212050	..	23632	44,340.363	4,44	4,44	
	May	..	1292	303020	..	..	40,316.842	4,18	4,18
	June	..	630	134350	..	24814	38,500.576	4,22	4,22	
	July	10.0	1034	200540	..	26110	43,134.038	4,2	4,2	
	August	10.2	874	187640	..	25388	45,846.496	4,2	4,2	
	September	10.3	672	15,690	..	25574	35,997.594	4,18	4,18	
	October	10.4	1197	210610	..	..	53,490.359	5,46	5,46
	November	..	842	220140	..	..	40,543.514	5,04	5,04
	December	..	1026	203320	..	..	—	—	—
		<i>Total</i>	10987	—	—	<i>Average</i>	43,388.061	4.54	—	—
WHEAL STRAWBERRY.	January	30.8	313	89780	6 0	21155	36,408.228	8,9	—	Diameter of the cylinder, 36 inches; length of the stroke, 6 ft. 3 ins.; working single. Thomas, Engineer.
	February	21.9	1394	464870	..	22269	44,557.489	10,18	—	
	March	..	1363	450040	..	..	44,117.127	11,57	—
	April	22.26	1711	531820	6 3	22640	43,981.607	11,9	—	
	May	..	1504	560530	..	..	52,736.033	10,8	—
	June	..	1183	398660	..	..	47,803.795	9,9	—
	July	..	1283	376570	..	..	43,215.454	9,34	—
	August	..	1323	434260	..	..	46,445.797	8,4	—
	September	..	1314	420250	..	..	45,100.163	8,7	—
	October	..	1440	462570	..	..	46,619.412	8,18	—
	November	..	1287	—	..	..	47,108.193	10,4	—
	December	..	1413	—	..	..	36,092.824	14,3	—
		<i>Total</i>	15678	—	—	<i>Average</i>	44,615.510	10,46	—	—

TABLE IV.—Continued.

ENGINES.	Month.	Load per square inch on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumps. Feet. <i>fms</i>	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL TOWAN, <i>Wilson's.</i>	January	11.11	1674	219240	8 0	69826	73,159,628	4.9	
	February	..	1800	212480	..	..	75,943,674	5.27	
	March	..	1872	246360	..	..	78,321,937	5.7	Diameter of the cylinder, 80 inches; length of the stroke, 10 feet; working single.
	April	..	2034	284030	..	..	64,272,876	5.8	
	May	..	2124	358400	..	..	67,958,713	5.6	
	June	..	1890	216520	..	..	63,817,269	5.36	
	July	..	1818	2277820	..	..	70,001,141	5.1	
	August	..	1944	234760	..	..	67,458,237	4.8	Drawing from 106 fins, below the adit; and discharging therein the water of a 16 inch pump, 8 feet stroke, = 69.8 gallons; average 342.02 gal. tons per minute.
	September	..	1476	189330	..	..	71,653,985	4.5	
	October	..	1686	177910	..	..	63,462,292	4.1	
	November	..	1818	196380	..	..	60,083,460	4.1	
	December	..	1746	203850	..	..	66,754,615	4.5	
	<i>Total</i>	<i>21760</i>				<i>Average</i>	<i>67,219,817</i>	<i>4.9</i>	
WHEAL TOWAN, <i>Druce's.</i>	January	8.53	1944	311540	8 0	638650	68,782,390	6.98	
	February	8.82	1908	294680	..	55417	68,452,183	7.3	
	March	..	2124	329950	..	..	68,869,450	7.82	
	April	8.89	1746	300040	..	55880	76,806,116	7.44	
	May	..	2196	334660	..	..	68,113,368	7.26	
	June	8.15	1809	287910	..	51237	65,562,865	7.14	
	July	8.96	2268	322300	..	56310	64,016,624	7.2	
	August	8.8	2358	346490	..	55515	65,260,024	7.07	
	September	9.03	2124	290770	..	58752	62,153,593	6.96	
	October	8.22	2160	304220	..	51679	58,228,834	7.04	
	November	9.03	2574	340340	..	56752	60,031,004	7.16	
	December	..	2394	353980	..	..	63,327,295	7.25	
	<i>Total</i>	<i>25598</i>				<i>Average</i>	<i>65,800,313</i>	<i>7.2</i>	
									per minute from Wheal Towan.

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
SOUTH TOWAN.	April	5.43	196	153010	7 0	8778	26,631,203	3.79	Diameter of the cylinder, 40 inches; length of the stroke, 9 feet; working single.
	May	2.56	212	194990	..	4141	24,932,485	3.14	Gray, Engineer.
	June	2.8	172	136580	..	4524	32,648,230	5.0	
	July	2.86	214	216180	..	4617	30,652,041	6.4	Drawing (a part of the year) from 70 fms. below the adit; and discharging therein the water of a 12 inch pump, 7 ft. stroke, =34.46 galls. average 311,98 gallons per minute.
	August	3.0	302	277120	..	4772	37,420,830	8.68	
	September	3.56	390	362650	..	5749	38,969,930	8.5	
	October	5.76	438	294600	..	8277	..	9.14	
	November	..	698	538960	..	..	..	9.3	
	December	..	616	431270	..	..	..
	Jan. 1836	9.7	720	314760	..	15892	48,020,135	7.8	N. B. This engine was altered and put in complete repair Nov. and Dec. months.
	February	10.3	762	345660	..	16655	52,793,727	7.98	
	March	11.58	812	361290	..	18700	58,242,439	8.09	
	<i>Total</i>	<i>5532</i>	<i>..</i>	<i>Average</i>	<i>..</i>	<i>38,930,113</i>	<i>9.08</i>	<i>..</i>	
WHEAL TOLGUS, Price's,	January	24.8	930	372270	6 0	12646	30,372,428	8.6	
	February	21.6	948	422540	..	11028	29,492,222	9.17	
	March	16.0	744	420000	..	8166	27,659,032	10.4	Diameter of the cylinder, 25 $\frac{1}{2}$ inches; length of the stroke, 6 feet; working single.
	April	16.7	918	496430	..	8537	27,899,496	11.49	
	May	19.4	1230	697610	..	9939	28,973,881	11.5	Michell, Engineer.
	June	20.2	1002	440810	..	10310	27,214,078	11.7	
	July	..	936	484320	..	..	32,088,584	12.0	
	August	..	1180	578790	..	..	30,342,330	11.4	This engine shannals a part of the water to Davey's and Horton's engines, to be by those engines delivered at the adit.
	September	..	954	4538560	..	..	28.113,230	10.9	
	October	..	930	411200	..	..	26,496,700	10.5	
	November	..	1152	577610	..	..	31.016,453	10.8	
	December	..	996	522170	..	..	32,431,160	12.5	
	<i>Total</i>	<i>11950</i>	<i>..</i>	<i>Average</i>	<i>..</i>	<i>29,324,949</i>	<i>10.91</i>	<i>..</i>	

TABLE IV.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps. Feet. Ins.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL TOLGUS, <i>Davey's.</i>	January	7.88	874	101500	7 6	40447	35,229,151	2,35	
	February	..	972	121250	..	..	37,841,039	2,63	Diameter of the cylinder, 70 inches; length of the stroke, 10 feet; working single.
	March	..	964	131270	..	..	41,308,177	3,25	
	April	..	882	144900	..	..	49,836,482	3,35	
	May	..	1080	171260	..	..	48,075,753	3,3	Michell, Engineer.
	June	..	846	144030	..	..	51,645,225	3,84	
	July	..	922	145620	..	..	47,911,270	3,6	Drawing from 93 fathoms below the adit; and discharging therein the water of a 14 $\frac{1}{4}$ ins. pump, 7 feet 6 ins. stroke, —51.9 gallons; average 190.47 gallons per minute.
	August	..	1068	199360	..	..	56,625,800	3,96	
	September	..	972	151380	..	..	47,244,343	3,88	
	October	..	882	139310	..	..	47,913,873	3,58	
	November	..	1426	222410	..	..	47,313,204	4,17	
	December	..	1644	257520	..	..	47,519,689	6,16	
<i>Total</i>		11532				<i>Average</i>	46,538,692	3,67	
WHEAL TOLGUS, <i>Horton's.</i>	January	9.8	1566	283230	7 6	50543	68,559,836	6,55	
	February	10.5	1760	322790	..	54018	—	7,0	Diameter of the cylinder, 70 inches; length of the stroke, 10 feet; working single.
	March	10.63	1860	280160	..	54530	63,800,100	7,2	
	April	..	10.68	2358	369110	..	54836	64,378,231	8,54
	May	..	2952	435250	..	..	60,638,640	8,4	
	June	10.75	1926	303500	..	55144	65,172,133	8,1	
	July	..	2142	322090	..	..	62,189,534	7,9	
	August	11.2	2691	388020	..	57551	62,337,845	7,7	
	September	..	2098	293410	..	..	60,364,772	7,27	
	October	11.3	1944	279250	..	58164	62,633,182	7,18	
	November	..	2934	415280	..	58471	62,070,135	7,8	
	December	12.36	2754	376040	..	63452	64,878,548	9,0	
<i>Total</i>		26979				<i>Average</i>	63,365,814	7,72	

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
UNITED MINES, <i>Cardozo's.</i>	January	7,84	32682	318350	8 0	56124	43,818,701	8.5	Diameter of the cylinder, 90 inches; length of the stroke, 9 feet; working single.
	February	8,19	2544	241670	..	58655	44,575,955	8.0	
	March	8,44	33432	316310	..	60400	45,538,806	7.8	
	April	..	3810	370580	46,998,492	8.56	Hocking & Loon, Engineers.
	May	..	3974	398700	..	..	48,478,087	8.14
	June	..	2794	309940	..	..	53,801,849	7.97
	July	..	3102	338450	52,720,515	8.1	Drawing from 125 fins, below the adit, and discharging therein the water of a 16 inch pump, 8 feet stroke, = 69.8 gallons; average 474.84 gallons per minute.
	August	..	3370	360770	..	..	51,728,208	7.16
	September	9,29	2504	253640	..	66510	53,898,474	6.17	
	October	..	1600	139160	..	..	—	3.1
	November	9,88	2468	236120	..	70688	64,140,897	6.8	
	December	..	3248	282990	..	..	51,019,229	6.78
	<i>Total</i>		35918				<i>Average</i>	6.8	
UNITED MINES, <i>Poldory.</i>	January	—	2346				—	—	Diameter of the cylinder, 86 inches; length of the stroke, 10 feet; working single.
	February	—	2240				—	—	
	March	—	2345				—	—	
	April	10,05	2000	246250	7 6	77280	—	—	Hocking & Loon, Engineers.
	May	..	2545	282330	..	..	64,298,022	6.7
	June	..	1602	203200	..	..	73,517,303	6.76
	July	..	1543	195450	73,417,252	5.23	Drawing from 137 fathoms below the adit, and discharging therein the water of a 17 inch pump, 7 ft. 6 in. stroke, = 73,80 gallons; average 373.88 gallons per minute.
	August	10,25	1795	218180	..	78765	71,803,402	4.33	
	September	10,6	1769	204990	..	80212	69,711,684	4.18	
	October	10,8	1659	189770	..	83189	71,411,835	4.25	
	November	11,1	1640	191790	..	85337	74,849,094	5.12	
	December	11,16	2262	264900	..	86832	75,387,588	6.13	Total 848.52 gallons per minute discharged by two engines in the United Mines.
							<i>Average</i>	5.03	
							<i>Total</i>	71,759,395	

TABLE IV.—Continued.

ENGINES.	Month.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by coals weighing a bushel of coal.	Number of strokes, per minute.	REMARKS.
UNITED MINES, <i>Little.</i>	January	17.96	752	463780	7	15218	70,394,958	9.47	
	February	..	638	402890	..	..	72,079,736	10.0	
	March	..	645	357090	..	..	63,192,473	8.8	
	April	..	784	444620	..	..	66,426,751	10.29	
	May	..	874	481070	..	..	62,826,696	9.8	Diameter of the cylinder, 30 inches; length of the stroke, 6 feet; working single.
	June	..	579	358410	..	..	70,900,889	8.2	Hocking & Laram, Engineers.
	July	..	519	299680	..	..	65,898,950	7.17	
	August	..	507	286210	..	..	64,435,354	6.68	Drawing condensing water from the adit for the use of the several engines at the Consolidated and United Mines; average 938.79 gallons per minute.
	September	..	721	393890	..	..	62,357,266	8.04	
	October	..	622	387640	..	..	71,135,367	8.7	
	November	..	685	373400	..	..	64,091,442	9.97	
	December	..	808	473100	..	..	66,832,693	10.96	
	<i>Total</i>		8092			<i>Average</i>	66,714,214	9.0	
WHEAL UNITY WOOD, <i>Williams's.</i>	January	7.99	992	110920	7	6	49569	39,859,526	2.65
	February	9.76	1328	153640	..	..	46672	—	—
	March	6.9	1328	163990	..	..	47756	42,867,362	4.06
	April	..	1720	212210	..	..	43,059,167	4.4	
	May	..	1832	216060	..	..	41,160,167	4.28	
	June	..	1130	144310	..	..	44,570,366	3.85	Diameter of the cylinder, 30 inches; length of the stroke, 10 feet; working single.
	July	7.03	1112	136300	..	..	43,381,714	3.44	Sims, Engineer.
	August	..	1371	164220	..	..	42,410,294	3.1	
	September	..	968	117310	..	..	42,908,404	2.8	
	October	..	1200	137120	..	..	—	—
	November	7.39	1376	144250	..	..	38,753,978	3.7	
	December	7.45	1704	191960	..	..	50356	42,219,258	4.76
	<i>Total</i>		16061			<i>Average</i>	42,115,017	3.7	

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal in bushels.	Number of strokes.	Length of the stroke, in the pumps.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL VIRGIN.	January	12.7	431	177320	7 0	11577	33,340,685	4.39	
	February	13.0	520	222540	..	11884	35,601,264	4.8	
	March	13.3	520	226290	..	12088	36,659,822	5.8	Diameter of the cylinder, 30 inches; length of the stroke, 9 feet; working single.
	April	14.67	652	268850	..	13317	38,186,889	5.98	
	May	15.23	672	290040	..	13828	41,777,845	5.59	Grose, Engineer.
	June	15.75	552	232960	..	14462	42,684,598	5.78	
	July	..	580	231590	..	40,366,137	5.74		
	August	17.0	732	236190	..	16516	35,490,306	5.02	
	September	18.0	696	216240	..	16388	35,597,577	5.0	
	October	18.4	1004	291860	..	16744	34,072,038	4.94	
	November	18.7	984	271890	..	16982	32,846,190	7.26	
	December	19.0	1132	300870	..	17289	32,166,245	6.96	
	Total	8475				Average	36,562,466	5.6	
WHEAL VOR, <i>Borlase's.</i>	January	12.26	1906	263040	8 0	77070	85,088,112	6.5	
	February	..	1984	265860	..	..	83,462,546	6.59	
	March	..	2537	317400	..	..	77,136,632	6.3	
	April	12.56	1946	241880	..	77884	77,246,478	6.0	
	May	..	2309	305330	..	..	82,180,184	6.0	
	June	12.4	2058	278600	..	77991	84,463,722	6.9	
	July	12.45	1996	264350	..	78260	82,917,959	6.55	
	August	..	2400	323780	..	..	84,463,409	6.4	
	September	12.48	1986	259720	..	78404	82,860,984	6.44	
	October	13.1	1825	238630	..	82377	86,024,759	5.9	
	November	..	2216	282310	..	..	83,956,140	5.6	
	December	13.16	1604	199390	..	82700	82,242,159	5.53	
	Total	24727				Average	82,670,257	6.22	

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pump.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL VOR, Trelawney's.	January	15.49	3275	269450	7 6	103802	64,052,173	6.88	Diameter of the cylinder, 80 inches; length of the stroke, 10 feet; working single. Richards, Engineer.
	February	..	3520	283590	..	..	62,721,326	7.03
	March	..	4770	350070	..	..	57,125,166	6.94
	April	15.77	3774	283990	..	104355	58,894,627	7.0	
	May	..	4230	353370	..	..	64,382,848	7.0
	June	15.8	3527	287080	..	104632	63,873,875	7.12	
	July	..	3371	275860	..	..	64,217,851	6.84
	August	15.65	4411	340450	..	104909	60,728,183	6.75	
	September	..	3438	258120	..	..	59,073,104	6.4
	October	..	3431	270060	..	..	61,931,779	6.7
	November	..	4330	340020	..	..	61,786,070	6.74
	December	..	3055	242870	..	..	62,551,347	6.75
	Total	45132				Average	61,868,195	6.83	Diameter of the cylinder, 53 inches; length of the stroke, 9 ft.; working single. Richards, Engineer. Drawing from 226 fms. below the adit; and discharging therein the water of a 14 inch pump, 7 feet 6 inches stroke, = 50,11 gallons; average per minute 342,25 gallons. Trelawney's 331,50 Total 752,78 gallons per minute of Wheal Vor. This engine was idle from end of May to the end of the year, and the water of it discharged by Borlase's and Trelawney's engines.
WHEAL VOR, Woolf's.	January	16.0	1358	215310	7 6	42466	50,473,388	5.34	
	February	..	1703	264480	..	..	49,439,744	6.55
	March	..	1927	285090	..	..	47,097,548	5.65
	April	..	1200	182480	..	..	48,409,663	4.5
	May	..	1002	133100	..	..	42,287,145	3.8
	Total	7190				Average	47,541,497	2.15	

TABLE IV.—Continued.

ENGINES.	Months.	Load per square inch, on the piston.	Consumption of coal, in bushels.	Number of strokes.	Length of the stroke, in the pumps. Feet, fms.	Load in pounds.	Pounds lifted one foot high, by consuming a bushel of coal.	Number of strokes per minute.	REMARKS.
WHEAL VOR, <i>Carleean District.</i>	January	16.48	1107	292580	5	226110	47,254,233	7.28	
	February	16.86	1231	316740	6	31088	46,923,834	7.85	Diameter of the cylinder, 45 inches; length of the stroke, 6 ft. 10 ins.; working single.
	March	17.0	1460	369350	..	..	46,690,697	7.3	
	April	..	1041	277920	..	..	49,273,587	6.9	
	May	..	1206	320510	..	..	49,050,042	6.36	
	June	..	937	244620	..	..	48,065,220	6.06	
	July	..	800	230100	..	..	46,855,977	5.7	
	August	..	967	287600	..	..	54,891,805	5.7	
	September	..	762	293290	..	..	54,082,830	5.50	
	October	..	734	220040	..	..	65,328,728	5.46	
	November	17.6	834	269180	..	34470	64,990,158	6.84	=19,000 gals; average 118.45 gallons per minute, of Carleean district.
	December	17.7	686	210860	..	31898	60,889,352	6.05	
		<i>Total</i>	11865				<i>Average</i>	61,190,788	6.2

In 1836, 61 engines reported ; average duty	46,6
Average duty of the best engine	85,4

In this year, Mr. Sims erected at Wheal Kitty, another stamping engine similar to that erected by him last year. Both these engines again proved the advantage to be derived from introducing into engines of this description, the improvements so successfully adopted in pumping engines.

In September the Stamps at Wheal Kitty performed 53,2 millions ; that at Charlestown United Mines 51,1

The following engines were reported above 60 millions in September, this year.

Wheal Darlington engine .. by Eustis	95,4
Fowey Consols by W. West	80,9
Consolidated Mines by Hocking and Loam	74,9
United Mines by ditto	74,4
Polgoon by Sims	74,2
Wheal Vor by Richards	70,7
United Mines by Hocking and Loam	69,7
Consolidated Mines by ditto	67,9
United Mines by ditto	66,7
Wheal Tolgus by Michell	64,2
North Roskear by J. West	62,1
Marazion Mines by Grose	62,0
Wheal Vor by Richards	61,1
Wheal Liberty by Hocking and Loam	60,1

In 1837, 58 engines reported ; average duty 47,0

Average duty of the best engine 87,2

The performance of the engines was still nearly stationary, and nothing deserving remark occurred, excepting the erection of another stamping-engine by Mr. Sims, at Carn Brea, similar to those already noticed, and not inferior to them in efficiency. The three engines performed as follows :

	Millions.
Wheal Kitty	56,3
Carn Brea	54,5
Charlestown United Mines.....	53,3

Other engines of this kind, with similar improvements, are in course of erection; which will come into the Monthly Reports in 1838; and from the known talents and skill of the engineers to whom is intrusted the care of erecting them, no doubt can be entertained of their efficiency.

The following engines were reported above 60 millions in December.

Fowey Consols engine	by W. West	85,0
North Roskear.....	by J. West	76,5
Wheal Vor	by Richards.....	75,4
United Mines	by Hocking and Loam.	74,1
Polgooth	by Sims	73,4
Wheal Darlington	by Eustis.....	72,4
Wheal Julia	by Sims	69,8
Consolidated Mines	by Hocking and Loam	66,3
Ditto	by ditto	66,2
United Mines	by ditto	65,6

In this place it may not be uninteresting to exhibit in a tabular form, the progress of improvement noticed in the foregoing pages. In table 5, beside the duty expressed in the usual way, we have inserted the depth of the mine, the whole quantity of coal consumed, and of water pumped out in the year, and the quantity of water drawn from the depth of 100 fathoms, for the consumption of one ton of coal.

TABLE V.

MINES.	Date.	Dia- meter of the cylin- der.	Depth under adit.	Coal in Bushels of 94lbs.	Water discharged in Imperial Gallons.	Water drawn 100 fms. deep for 1 ton of coal.	Pounds lifted one foot high for one Bushel of coal.
		inches	fms			Imp. Galls	
Wheal Alfred	1814	60	125	39543	120,232,000	103000	25,804,693
		66	125	35748	Shammal	87000	21,780,441
		64		47052	205,300,000	101000	25,342,545
	1828	90	160	28090	—	169000	42,146,303
		52		17488	—	113000	28,372,803
		70		41836	—	160000	39,981,842
Wheal Ann	1814	60	70	28184	137,791,000	85000	21,183,770
	1814	63	160	32786	129,487,000	102000	25,570,747
		45		4842	Shammal	131000	32,628,964
Wh. Abraham	1821	45	225	20476	152,187,000	176000	43,908,061
		66	160	40644	Shammal	114000	28,616,602
		60	147	23220	152,729,000	140000	35,117,823
	1814	30	95	20416	50,468,000	64000	15,964,567
Blue Hills	1814	58	60	13195	69,500,000	74000	18,596,131
	1821	64	115	42840	289,569,000	137000	34,357,414
	1828	70	160	28011	355,854,000	237000	59,247,750
		63		35319	Shammal	138000	34,438,550
Binner Downs		42	70	12824	167,288,000	178000	44,467,859
	1835	42	145	21463	133,744,000	158000	39,553,537
		50	80	13879	246,070,000	207000	51,768,734
		24	60	3238	23,679,000	145000	36,130,544
		64	88	8983	89,520,000	187000	46,817,628
	1821	36	110	7631	48,365,000	71000	17,783,356
Wheal Beauchamp	1828	36	72	9211	62,055,000	113000	28,229,431
	1835	36	74	8915	65,842,000	123000	30,650,390
		36	74	6594	74,378,000	152000	37,903,419
Wheal Basset	1821	24	34	11942	100,715,000	80000	19,909,816
Balnoon	1828	30	48	2926	44,250,000	76000	19,042,204
Wheal Busy	70	129		36564	251,821,000	187000	46,762,258
Ballaswidden	1835	24	43	1525	6,475,000	139000	34,693,065
		70	203	40644	204,874,000	99000	24,669,539
Crenver		70		43180	Shammal	99000	24,827,637
	1821	70	210	39410	252,498,000	131000	32,720,499
		70		40644	Shammal	134000	33,497,824
	1821	90	158	48575	169,937,000	129000	32,219,191
		90	122	37588	107,375,000	138000	34,602,944
	1828	90	230	28814	226,608,000	222000	55,564,270
		70	84	23815	250,807,000	188000	46,935,386
		58	147	26711	107,349,000	155000	38,717,183
Consolidated Mines		90	173	19789	125,144,000	251000	62,658,505
		90	178	43592	156,559,000	139000	34,790,596
		70	146	16603	107,489,000	208000	51,891,029
	1835	85	243	34594	161,890,000	285000	71,281,509
		65	262	13182	43,068,000	206000	51,502,020
		90	262	43186	163,262,000	223000	55,776,172
		90	205	40306	156,671,000	191000	47,807,014
		65	160	11017	75,834,000	214000	61,108,450
		80	262	29977	141,654,000	297000	74,128,086

TABLE V.—Continued.

MINES.	Date.	Diam-	Depth	Coal in	Water	Water	Pounds lifted
		eter of					
		inches	feet	Bushels	Imperial Gallons.	fms. deep	for one Bushel
				94lbs.		for 1 ton	of coal.
Cook's Kitchen .	1814 36	100	9710	29,092,000	67000	16,854,447	
Chasewater	1814 66	88	92112	369,260,000	95000	23,661,774	
Cardrew Downs {	1828 27	56	21706	143,270,000	84000	21,084,230	
	1836 66	30	10732	120,404,000	137000	34,216,699	
Wheal Chance ..	1828 45	98	21312	94,845,000	104000	25,956,892	
Carzise.....	1828 50	70	9412	77,570,000	137000	34,306,170	
Wheal Caroline .	1828 30	63	19965	193,620,000	130000	32,404,944	
Crinnes Consols {	1828 53	46	21502	182,810,000	124000	31,103,724	
	56	63	14880	119,016,000	107000	26,652,721	
	1814 69 {	210	54065	<i>Shammal</i>	88000	21,445,912	
	45 {	9883	104,142,000		107000	26,756,063	
Dolcoath	63	140	18250	78,618,000	128000	32,027,842	
	1821 76	200	33649	109,115,000	168000	42,049,549	
	64	178	16381	63,356,000	105000	26,146,480	
	1828 76	195	35335	109,587,000	157000	39,229,059	
	64	162	17478	60,278,000	115000	28,713,820	
	1835 76	190	25686	111,001,000	180000	45,020,374	
Wheal Damsel {	1814 42	140	21628	37,417,000	63000	15,827,783	
	1821 42	135	17189	51,225,000	93000	23,252,867	
	1828 42	163	19745	74,644,000	140000	35,074,144	
	50	133	7272	27,894,000	125000	31,277,924	
Wheal Druid . . .	1835 50	173	9528	30,298,000	143000	35,756,664	
	1814 28	50	7688	49,858,000	61000	15,330,619	
Wh. Darlington .	1835 80	79	29126	477,565,000	301000	75,133,434	
Ding-Dong	1835 30	88	2852	20,956,000	132000	33,096,624	
East Crinnes . . .	1828 60	41	17260	160,726,000	87000	21,831,073	
	70	60	28068	292,750,000	140000	34,882,447	
	1835 76	126	26726	205,373,000	238000	59,528,571	
East Wh. Unity	41	122	10922	79,203,000	203000	50,643,323	
	1828 45	41	12249	113,114,000	89000	24,777,456	
Wheal Fanny . . .	1814 58	110	43438	174,815,000	84000	20,891,689	
	1814 48	97	17316	109,104,000	86000	21,403,516	
Wheal Fortune {	53	130	24822	158,507,000	79000	19,687,750	
	1814 40	54	16771	111,806,000	80000	20,071,809	
Fowey Consols ..	1835 80	134	9253	124,909,000	367000	91,672,210	
	1828 60	116	22250	87,139,000	152000	36,066,577	
	1835 60	116	16840	89,210,000	171000	42,817,551	
Great Work . . .	60	135	10800	65,211,000	261000	65,324,782	
	1828 60	62	25228	195,712,000	129000	32,273,156	
	1835 60	79	18558	121,151,000	127000	31,833,554	
Great St. George	40	86	6017	58,142,000	206000	51,607,062	
	70	69	18630	132,430,000	148000	37,046,760	
	1821 36	88	22650	122,412,000	99000	24,652,807	
Wh. Harmony {	1828 70	44	12090	131,941,000	118000	29,585,978	
	1821 58	110	34544	125,151,000	114000	28,576,828	
Great Hewas . . .	1828 60	75	12185	197,587,000	282000	70,542,860	
Wheal Hope . . .	1835 39	132	4945	25,802,000	113000	28,330,165	
Lanescot	1835 24	64	3743	34,125,000	157000	39,167,486	

TABLE V.—Continued.

137

MINES.	Date.	Diam-	Depth	Coal in	Water	Water	Pounds lifted
		eter of					one foot high
		inches	feet	Bushels	discharged in	feet deep	for one Bushel
				94lbs.	Imperial Gallons.	for 1 ton	of coal.
Wheal Leisure	1835	70	114	25860	232,226,000	238000	59,487,964
		66	84	15138	139,694,000	209000	41,828,472
Millanear.....	1814	58	48	20313	223,996,000	93000	23,163,002
Wheal Montague.	1828	28	87	15080	106,762,000	101000	25,359,708
Marazion Mines.	1835	60	70	14566	180,507,000	275000	68,760,243
Wh. Neptune.	1814	52	79	23768	98,818,000	60000	14,961,508
	1821	52	115	19256	103,843,000	100000	24,929,424
North Downs...	1828	70	48	23220	302,888,000	153000	38,329,044
Palladdras....	1814	24	20	4143	21,276,000	43000	10,779,619
	1828	70	102	21517	146,793,000	174000	43,412,792
Pembroke ...	1821	60	43	27636	132,714,000	101000	25,244,189
	1828	80	135	29992	198,689,000	178000	44,542,395
Penberthy Crofts	1821	40	50	3410	25,443,000	95000	23,853,757
	1835	50	63	9247	179,471,000	172000	42,987,012
Poldice		40	148	11873	124,073,000	224000	55,920,730
	1821	64	102	44276	166,862,000	95000	23,826,591
Wheal Penrose..	1821	64	115	81520	308,858,000	73000	18,625,948
		60	118	26492	122,465,000	142000	35,591,229
Wheal Penwith..	1828	90	147	45251	249,988,000	199000	49,693,251
		60	137	39166	156,124,000	124000	30,942,327
Perran Mines ...	1828	36	53	10011	73,643,000	126000	31,512,129
	1835	90	84	28952	241,098,000	167000	41,729,875
Wheal Prudence.	1828	40	47	6740	60,890,000	85000	21,141,142
Polgooth	1835	38	64	16097	79,103,000	91000	22,881,046
Wheal Prudence.	1835	66	50	17254	385,549,000	288000	72,052,179
Rosewall Hill ...	1835	33	78	12218	67,540,000	133000	33,350,540
Wheal Rose ..	1814	30	165	6811	10,675,000	61000	15,261,343
Wheal Rose ..	1821	45	80	21358	219,964,000	101000	26,307,880
	1828	45	84	28714	221,066,000	140000	34,900,773
Wheal Reeth ..	1828	36	190	10354	36,036,000	105000	26,268,908
	1835	36	160	11348	38,669,000	95000	23,769,714
North Roskear..	1835	70	82	6118	57,154,000	241000	60,817,691
South Roskear ..	1835	66	91	11532	65,837,000	168000	41,996,019
Relistian.....	1835	66	110	11051	68,551,000	172000	42,975,360
Roche Rock	1835	36	60	9826	140,871,000	170000	42,381,422
Wheal Sparnon ..	1814	66	44	53460	282,810,000	65000	16,375,383
Wheal Squire...	1821	63	114	27948	104,694,000	116000	28,957,430
St. Ives Consols	1828	36	139	11156	55,456,000	124000	31,105,769
	1835	50	130	10997	68,703,000	174000	43,368,061
Wh. Strawberry.	1835	36	80	15478	141,281,000	178000	44,515,510
Tincroft	1814	48	108	19370	68,416,000	81000	20,217,011
	1821	66	120	24617	192,643,000	161000	40,287,661
Wheal Towan..	1814	64	79	34578	217,409,000	66000	16,430,929
		50	64	14814	110,649,000	48000	11,908,005
Wheal Towan..	1828	80	105	22937	243,548,000	309000	77,285,314
		80	91	8903	105,890,000	217000	54,276,664
Wheal Towan..	1835	80	106	21760	179,766,000	269000	67,219,817
		80	130	25596	202,082,000	263000	65,800,313

TABLE V.—Continued.

MINES.	Date.	Diame-	Depth	Coal in	Water	Water	Pounds lifted
		ter of	under	Bushels	discharged in	drawn 100	
		the	adit.	of 94lbs.	Imperial Gallons.	fms	for one Bushel
		inches	fms				of coal.
South Wheal Towan	1821	20	25	9983	117,277,000	85000	21,177,165
	1835	40	70	5532	163,977,000	15600	38,930,113
Treskerby	1814	50	64	44560	166,158,000	70000	17,489,413
	1821	58	100	23848	174,200,000	163000	40,642,417
Ting-Tang	50	94	15476	34,017,000	92000	23,009,941	
	1828	58	94	30178	222,420,000	165000	41,211,627
Tresavean	1821	63	90	16288	110,912,000	124000	31,105,425
	1828	63	124	34724	173,462,000	158000	39,515,966
Wheal Trevoole .	1828	60	156	16887	62,660,000	89000	22,167,212
	1828	30	80	12674	141,647,000	159000	39,700,548
Wheal Tolgus. . . .	1835	25½	—	11950	Shammal	117000	29,326,949
	70	93	11532	100,111,000	186000	46,538,692	
United Mines	70	130	28979	210,587,000	253000	63,365,814	
	1814	63	136	75944	196,769,000	92000	23,002,258
Wheal Unity Wood .	63	152	106482	224,442,000	88000	22,036,845	
	63	110	77904	199,365,000	78000	19,547,062	
United Hills	1821	63	141	68436	177,895,000	103000	25,832,865
	63	154	78362	204,821,000	108000	27,070,643	
Wheal Vor	63	131	50834	186,972,000	123000	33,785,499	
	65	152	64248	178,988,000	110000	27,462,233	
Wheal Virgin	1828	30	—	9509	—	133000	33,256,662
	90	52	37846	382,270,000	147000	36,679,064	
Wheal Virgin	1835	30	—	8092	—	267000	66,714,214
	90	125	35918	249,471,000	199000	49,667,908	
Wheal Virgin	85	137	23745	196,511,000	287000	71,799,395	
	1821	52	90	16804	85,999,000	103000	25,819,044
Wheal Virgin	58	79	29498	136,656,000	102000	25,473,880	
	60	84	43050	163,393,000	92000	23,082,280	
Wheal Virgin	1828	60	100	34448	158,353,000	110000	27,481,996
	1835	80	94	16061	161,096,000	168000	42,115,017
Wheal Virgin	1828	58	70	9770	78,528,000	121000	30,387,010
	1814	48	108	54209	128,877,000	75000	18,801,663
Wheal Virgin	45	26	8772	51,593,000	55000	13,688,135	
	1821	48	110	5926	37,843,000	106000	26,519,870
Wheal Virgin	45	120	14495	48,066,000	99000	24,816,453	
	63	160	61675	163,567,000	103000	25,824,266	
Wheal Virgin	53	126	49657	177,784,000	124000	30,948,133	
	1828	48	96	9187	45,438,000	118000	29,472,795
Wheal Virgin	63	188	49951	99,570,000	97000	24,170,852	
	53	140	32665	121,626,000	157000	39,204,043	
Wheal Virgin	80	192	41022	177,631,000	220000	55,045,612	
	70	116	10889	63,535,000	180000	46,001,718	
Wheal Virgin	1835	80	195	24727	174,179,000	331000	82,870,257
	53	116	7190	41,596,000	190000	47,541,497	
Wheal Virgin	80	226	45132	179,887,000	247000	61,868,195	
	45	108	11865	62,205,000	205000	51,190,788	
Wheal Virgin	1835	30	60	8475	101,131,000	146000	36,562,466

At the end of Mr. Taylor's paper before quoted, was inserted a Table which we have corrected from documents in our hands, and brought down to the present time: it is as follows.

TABLE VI.

Shewing the number of Engines reported in each year, the average duty of the whole, and the average duty of the best engine.

Years.	No. of engines.	Average duty of the whole.	Average duty of the best engine.	Years.	No. of engines.	Average duty of the whole.	Average duty of the best engine.
1812	21	19,300,000	—	1827	51	32,100,000	59,700,000
1813	29	19,500,000	26,400,000	1828	57	37,100,000	76,800,000
1814	32	20,600,000	32,000,000	1829	53	41,700,000	77,000,000
1815	35	20,500,000	28,700,000	1830	56	43,300,000	78,000,000
1816	35	23,000,000	32,400,000	1831	58	43,400,000	71,100,000
1817	35	26,500,000	41,600,000	1832	59	45,000,000	85,000,000
1818	36	25,400,000	39,300,000	1833	56	46,600,000	84,300,000
1819	40	26,300,000	40,000,000	1834	52	47,800,000	90,900,000
1820	46	28,700,000	41,300,000	1835	51	47,800,000	91,700,000
1821	45	28,200,000	42,800,000	1836	61	46,600,000	85,400,000
1822	52	28,900,000	42,500,000	1837	58	47,000,000	87,200,000
1823	52	28,200,000	42,100,000	1838	61	48,700,000	84,200,000
1824	49	28,300,000	43,500,000		10	<i>Stamping Whim</i>	56,000,000
1825	56	32,000,000	45,400,000		12		17,000,000
1826	51	30,500,000	45,200,000				

On inspecting the foregoing Tables, especially the first four, we are struck with the fact, that the duty performed advances with the size of the engine, till it reaches a certain point, (namely, 80-inch cylinder,) and then recedes. And this appears to be the case with considerable regularity, in all sizes, and through all the four periods we have selected. The following Table shews this clearly: it is formed of averages taken of all the engines inserted in the reports for those four years.

TABLE VII.

Shewing the duty performed in the years 1814, 1821, 1828, and 1835, and the coal consumed in bushels of 94 lbs. in the last of those periods, by Engines of different sizes.

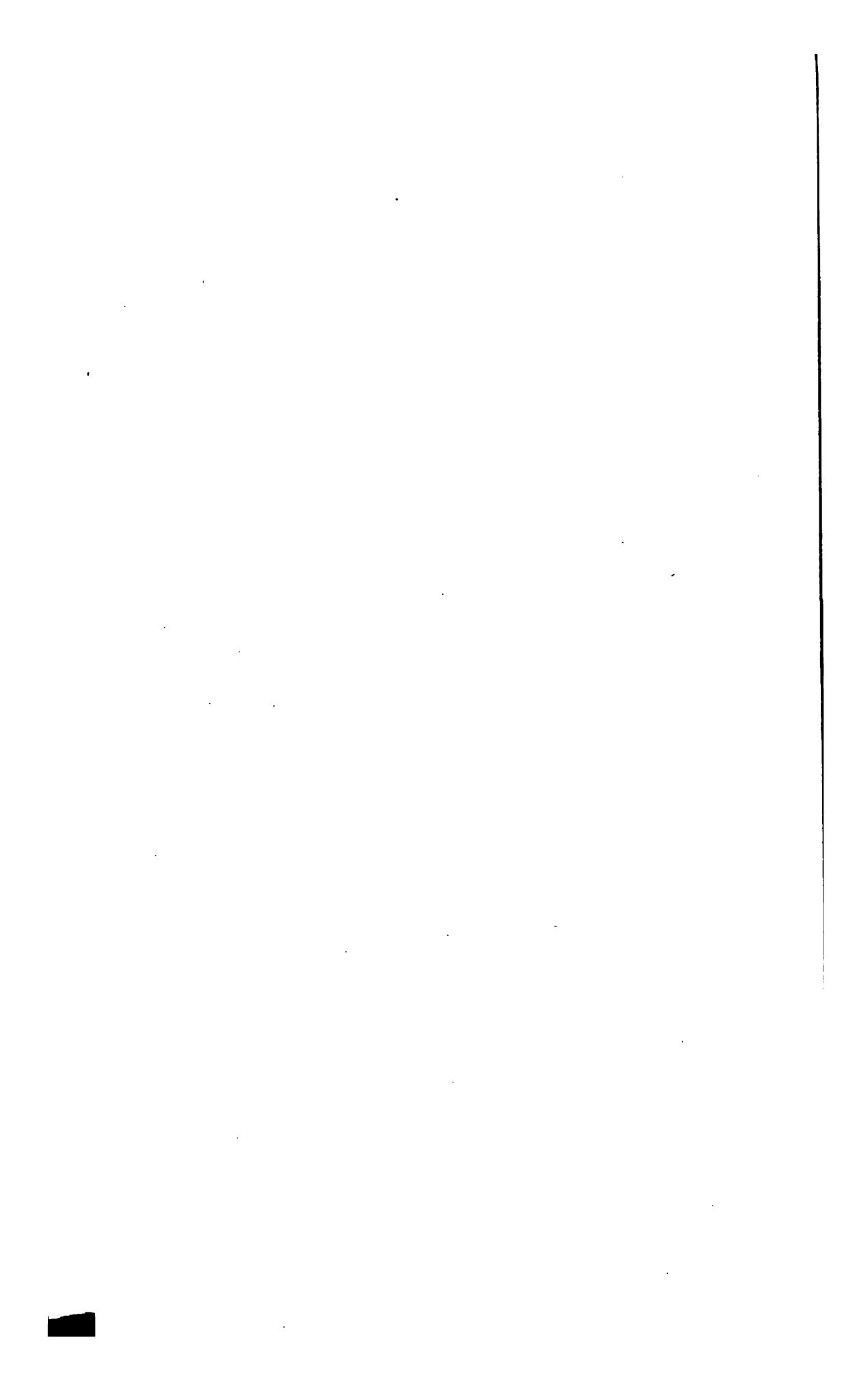
Diameter of the cylinder in inches.	Average duty performed in each period.				Average coal con- sumed by each.
	1814	1821	1828	1835	
Not above 30	14,334,787	19,906,629	26,469,886	34,222,248	5650
30 to 40	18,463,128	23,041,141	26,427,454	38,120,271	9115
40 — 50	19,857,833	28,399,703	33,366,910	45,041,159	12557
50 — 60	20,082,990	29,100,795	34,760,278	48,749,858	12931
60 — 70	23,361,961	28,448,604	41,368,247	52,171,122	15038
70 — 80	31,210,294	38,005,770	54,075,808	64,391,181	23857
80 — 90	27,437,129	33,411,967	47,877,137	55,117,982	33501

NOTE 1.—There having been no engine reported above the size of 70-inch cylinder, in 1814, the averages for the diameters 70 to 80, and 80 to 90 for that period, are formed by proportion from those of the next period, 1821.

NOTE 2.—The average duty performed by engines from 70 to 80-inches cylinder, for the year 1821, is an average formed from engines of that size, reported in that year, joined with others reported in the years immediately preceding and following that period.

NOTE 3.—Up to the year 1836, there were no stamping-engines or whim-engines above 30-inch cylinder: the average quantity of coal consumed by each engine of these descriptions, taken from the reports of that year, was 9726 bushels, and 2021 bushels, respectively.

There is another thing which, although not connected with the improvement of the steam-engine, is made known by the monthly reports; and which we think sufficiently interesting to be worth recording in this place: we mean the season of the year at which the greatest and least quantities of water are pumped from the mines. In the following Table will accordingly be found forty mines selected with this view. The Maximum from these forty mines is 20,000 gallons per minute; and the Minimum about half that quantity. In arranging them we have set down the most westerly first, beginning near the Land's-end, and taken the others in order, as they occur in an easterly direction. We have also added the nature of the rock in which the lode is situated.



It will be seen from the foregoing Table, that the months in which the greatest and the least quantities of water are discharged from the mines, are sufficiently irregular; yet it may be remarked that the maximum mostly occurs in the spring, and the minimum in the autumn quarter.

About the close of the year 1834, we ascertained, chiefly by personal inspection and enquiries made on the spot, the number of engines then at work in the County, and their several dimensions. The result of our investigation will be found in the following Table.

TABLE IX.

Containing an account of the Steam Engines employed on all the Mines in Cornwall, at the end of 1834.

PUMPING ENGINES.

MINES.	Diameter of cylinder.			MINES.	Diameter of cylinder.		
	Inches	Foot.	Foot.		Inches	Foot.	Foot.
Wh. Darlington.	80	10	8	Levant	26	4	4
Marazion Mines {	60	9	8	Botallack	30	6	5
	19	6,5	6,5	Wheal Edward..	20	5	5
Wheal Reeth ...	36	7,5	7,5	Wheal Boys	24	7	6
Wheal Mary....	20	6	6	Boscastle Downs	24	6	6
Retallack.....	36	7,84	7,75	Wheal Cunning ..	22	6	5
St. Ives Consols .	50	—	—	Ballaswidden....	24	7	6
Balnoon	30	8	7	North Roskear {	70	10	8
Wheal Trenwith.	30	8	7		36	8	6
Hallamanning ...	36	8,66	6,25	South Roskear. {	60	9	7
Great-Work .. {	60	9	7		30	8	6
	60	8	7	East {	80	10,33	7,75
	80	10	8	Wheal Crofty. {	36	8	7
	80	10	7,5	Wheal {	36	7,75	6
Wheal Vor ... {	53	9	7,5	Beauchamp ... {	36	8	6
	45	6,8	5,6		70	10	7,5
	24	6	6	Wheal Tolgus .. {	70	10	7,5
	48	9	7		25,5	6	6
Wheal Virgin ...	30	9	7	West Wh. Tolgus	36	9	7
Relistian	60	9	7,5	Wheal Mary....	45	7	7
	70	10	7,5	Wheal Harmony	70	9,25	7
Binner Downs {	50	9,66	8	Wh. Montague...	40	8	6
	42	9	7,5	Wheal Tehidy...	36	9	7
	24	5,25	5,25	Wheal Fortune..	50	9	7
Wh. Strawberry {	36	6	6	South {	40	7,5	6,2
	24	4	4	Wheal Basset {	30	7	6
Ding-Dong ... {	30	6	6	Cardrew.....	66	8,75	7
	21,5	5	4	Wh. Unity Wood	80	10	7,5

144 TABLE IX.—PUMPING ENGINES.—Continued.

MINES.	Diam- eter of cylin- der.	Stroke in cylinder	Stroke in pump.	MINES.	Diam- eter of cylin- der.	Stroke in cylinder	Stroke in pump,
	Inches	Feet.	Feet.		Inches	Feet.	Feet.
Poldice	90	10	7	Fowey Consols ..	80	10,25	9,25
West Poldice....	56			Lanescot	24	8,5	5,5
Cathedral	36	9	7	Roche Rock	36	8,5	6,8
Wheal Damsel ..	50	9,33	7,25	Trelwer	70	7,5	7,5
Wheal Jewel....	39	8,5	6	Trugoe.....	32	8	6,5
Consolidated Mines....	85	10,33	7,75	Wheal Leisure {	70	10	8
	80	11,33	8,75		66	9,83	7,75
	65	9	7,5		60	10	6,5
	65	9	7,5	Gt. St. George {	40	9	7,5
	90	10	7,5		70	10	7,5
	90	10	7,5		33	8,75	6,75
United Mines.	90	9	8	Wheal Prudence ..	60	10	7,5
	85	10,33	7,75		40	9	7
	30	9	7,5	Wheal Reen	36	9	7
	70	10	7,5		60	9	7
	64	8	6	Wheal Cornwall ..	40	9	7
	58	9,5	8,2		70	8	8
Wheal Gilbert ..	27	8	6	Wheal Charlotte ..	76	9	7,5
Polgoooth	66	9,8	7,4		60	8	5,5
Pentewan	27	6	6	Stray-Park	36	9	7
Pembroke	50	9	7		60	9	7
	40	9	6,5	Tincroft	76	9	7,5
East Crinnes ..	76	10,33	7,25		60	—	—
	41	9,3	7,25	Carn Brea.....	63	—	—
Tresavean							

STAMPING ENGINES.

MINES.	Diam- eter of cylin- der.	Stroke in cylinder	Stroke on crank.	MINES.	Diam- eter of cylin- der.	Stroke in cylinder	Stroke on crank.
	Inches	Feet.	Feet.		Inches	Feet.	Feet.
Wheal Vor ...	24	6,5	6,5	St. Ives Consols ..	20	4	4
	27	5	5	Balloon	20	4	4
	16,5	5	5	Ballaswidden....	24	5	5
	24	5	5	West Poldice ...	24	4	4
	16	3,5	3,5	Polgoooth	27	5	5
	14	4	4	Great St. George ..	20	5	5
Wheal Reeth ...	20	5,75	5,75	Carn Brea	20	5	5

TABLE IX.—Continued.

145

WHIM ENGINES.

MINES.	Diam- eter of cylin- der.			MINES.	Diam- eter of cylin- der.			
	Inches	Feet.	Stroke in cylinder		Inches	Feet.	Stroke in cylinder	Stroke on Crank.
Marazion Mines .	18	4	4	Binner Downs {	19	4,5	4,5	
	20	4	4		19	4,5	3,5	
Wheel Reeth.. {	20	4	4	Wh. Strawberry {	10	4	4	
	15	4	4		12	3,5	3,5	
Wheal Mary....	14,5	3,75	3,75	Great Work	15	3,5	3,5	
St. Ives Consols {	20	4	4		18	4	4	
	20	4	4	Wheal Vor... {	16	4	4	
Wheal Trenwith.	18	4	4		16	4	4	
Ding-Dong... {	12	4,5	4,5	Relistian {	22	5	5	
	15	5	5		22	5	5	
Levant {	20	4	4	Pembroke {	18	5	5	
	20	4	4		18	5	5	
Wheal Cock	16	3,5	3,5	East Crinnes.. {	16	4	4	
Boscaswell Downs	18	4	4		18	4	4	
Wheal Tolgus. {	20	4	4	Fowey Consols. {	18	4	4	
	18	4	4		18	4	4	
	20	4	4	Wheal Leisure ..	18	4	4	
	20	4	4	Great St. George	18	4	4	
Consolidated	20	4	4	North Roskear..	18	4	4	
Mines.... {	24	4	4	South Roskear {	16	4	4	
	24	4	4		22	5	5	
	21	4,7	4,7	East Wh. Crofty.	26	5	5	
	21	4	4	Cook's Kitchen..	15,5	5	5	
	22	4	4		16	5	5	
United Mines ...	20	4	4		20	5	5	
Wh. Unity Wood	20	4	4	Dolcoath {	20	5	5	
Poldice {	20	4	4		20	6	6	
	20	4	4		18	4,5	4,5	
Wheal Damsel..	20	4	4		16	4	4	
Wheal Jewel....	20	4	4	Stray-Park... {	13,5	7	7	
	20	4	4		13,5	4,5	4,5	
Tresavean {	20	4	4	Carn Brea.... {	18	4	4	
	20	4	4		18	4	4	

Having thus, briefly and with as much clearness as was in our power, extracted and arranged the substance of the records of twenty-seven years; it remains to sum up the whole, by laying before the reader, in the tangible form of pounds, shillings, and pence, the amount saved to the county in one source of expenditure at least, by the improvements whose progress we have endeavoured to trace.

In Table VII will be found the average duty, and average annual consumption, of engines differing from each other by ten inches in the diameter of the cylinder. And, from Table IX, we collect how many engines of each size were at work in the county in 1835. From Table VII therefore, and the appended Note 3, we are enabled to form an approximate estimate of the whole quantity of coal consumed by all the engines in the last-mentioned year; and, from the same Table VII, we can calculate what that consumption would have been had the engines remained unimproved from either of the preceding periods.

The following Table exhibit an estimate of this sort.

TABLE X.

Being an approximate calculation of the coal consumed in one year, by all the Engines working on the mines in Cornwall: as also of the quantity which would have been consumed by the same Engines, had they remained unimproved from 1814. Shewing the annual saving of expence in the article of fuel alone, arising from the improvement which has taken place in Steam Engines since that time.—Formed by comparison from Tables 7 and 9.

Number of engines and the diameter of the cylinder.	Bushels of coal consumed by each engine in 1835.	Total number of Bushels consumed in 1835.	Number of bushels of coal which would have been consumed at the average duty performed in 1814.
PUMPING ENGINES.			
24 engines not exceeding 30 inches.	5650	135600	323725
23 ——— from 30 to 40 inches.	9115	209645	346845
10 ——— from 40 to 50 inches.	12557	125570	284816
14 ——— from 50 to 60 inches.	12931	181034	439465
17 ——— from 60 to 70 inches.	15038	255646	570899
10 ——— from 70 to 80 inches.	23857	238570	492200
6 ——— from 80 to 90 inches.	33501	201006	403798
STAMPING ENGINES.			
14 ———; none above 30 inches.	9720	136164	743634
WHIM ENGINES.			
66 ———; none above 30 inches.	2821	186186	444493
Whole annual consumption in bushels		1669421	4049878
Equal to Tons		69559	168745
Amounting at 17s. $\frac{1}{2}$ Ton including carriage		£ 59125	£ 143433
Which shews a saving in fuel to the amount of £ 84300 $\frac{1}{2}$ annum.			

It may not be amiss in this place, to say a few words in reference to the Tables, into which we have endeavoured to compress the facts more particularly set forth in the preceeding pages.

The first four Tables contain all the particulars published in the monthly reports, with the exception of the dimensions of the lifts or columns of pumps ; instead of which we have inserted, the depth of the mine, and the diameter only of the tye-lift or top-most column. We have also so arranged the reports as to exhibit the work performed by the same engine for each month in succession throughout the year. These four Tables form the source, chiefly, from which our averages and comparisons are afterwards drawn.

Table V is a still further compressed view of results drawn from the first four. In this Table may be seen by inspection, the progressive improvement of the same engine, or of all the engines together, at four successive intervals of seven years. And by comparing the coal consumed and water discharged on the same mine, at different periods, the improvement will be placed in a very striking point of view. For example: Wheal Towan was working in 1814, and also in 1835: the mine was drained by two engines at both periods. In 1814 the depth of the mine was 79 fathoms, and 328 million gallons of water were pumped out by the consumption of 49000 bushels of coal. In 1835 the consumption was 2000 bushels less ; yet the mine was 50 fathoms deeper, and the water discharged 53 million gallons more. Or, to put it in another form ; in 1814 the greatest quantity of water pumped 100 fathoms deep, in Wheal Towan, by the consumption of a ton of coal, was 66000 gallons ; while in 1835, 269000 gallons were drawn from the same depth for the same expenditure.

Table VI contains, yet more briefly expressed, the duty performed, and consequently the improvement made by all the engines, from the first publication of the reports to the present time: being a period of 27 years.

Table VII shows the average duty performed by engines which differ from each other in size, by ten inches in the diameter of the cylinder. The uniformity observable almost throughout this Table, in all the four periods, is striking. But it is not interesting as a matter of curiosity merely; it shows that although a larger engine will cost more in the erection, it may, in some cases, be more economical than a smaller. For example: two 57-inch engines are equal in power to one 80-inch: but, from Table 7, it appears that two 57-inch engines will consume on an average, 25000 bushels of coal per annum; and that an 80-inch engine will do one third more duty; and consequently will perform the same work for 6000 bushels of coal per annum less. In a Note attached to this Table, we have also shewn the average quantities of coal consumed per annum by stamping-engines, and by whim-engines; which are not inserted in the first four Tables.

Table VIII shows the greatest and least quantities of water drawn from some mines in several years, and the months in which they respectively occur: as likewise the nature of the rock in which the lode is found. This Table we presume, will not be entirely useless as a record of facts; although it would be more interesting in a meteorological, and perhaps in a geological point of view, did the maximum and the minimum quantities occur always in the same months in mines similarly situated. But when it is considered how

many circumstances conspire to affect the descent of water into a mine,—its depth, its situation as near the sea coast or more remote from it, on high ground or in a valley, in granite or in killas,—perhaps greater uniformity was not to be expected.

Table IX contains a list of all the engines working in the county at the end of 1834; with the diameter of the cylinder and the length of the stroke. This we considered might be interesting to many persons at present, and useful as a Table of Reference at a future time. We also found it necessary in order to form the estimate contained in the next Table.

Table X is the summing up of the argument, or the conclusion drawn from the foregoing premises. It contains, selected from Table IX, the number of engines at work in the county in 1835, of each size differing from each other by ten inches in the diameter of the cylinder; and it shows also, from the average laid down in Table VII, the quantity of coal consumed in that year, as well as the quantity which would have been consumed by the same engines in the same time, had they remained unimproved from the year 1814. And when it is considered that the engines had then been reported, and that improvement had consequently been going on, for three years, we think we have not assumed unfair grounds on which to found the conclusion, that the saving to the county amounts to *a Hundred Thousand Tons of Coal, or Eighty Thousand Pounds Sterling per Annum.*

We have now attained the object we had in view. We have marked the rise, and traced the progress of the improvement made in the steam-engines in Cornwall; estimated the amount; and described the exciting cause.

It remains that we point out, very briefly, in what that improvement consists.

During the existence of Boulton and Watt's patent right, and for some years afterwards, many and strenuous were the efforts made by men possessing scientific knowledge, or practical skill, or both, to discover something new in principle, or some modification in construction, sufficiently distinct and definite, and, at the same time possessing advantages enough, to ensure them a share of the profits, without encroaching on the exclusive privileges of those patentees. They found it hard to believe that the steam-engine, like some other works of genius, had attained its most perfect form at once. Under this impression, one man made the construction more simple. He inverted the cylinder over the shaft, and connected the piston rod immediately with the pit-work: thus dispensing with the main-beam and all its appendages. Another made it more complex, by adding a second cylinder, and working the same steam a second time; thus having the benefit of a greater expansion. The former again discharged the condensing water through a descending column of sufficient length; the latter, on the contrary, discharged it through the top of the receiver: the object of both was the same,—to get rid of the air pump: which a third more effectually accomplished by not condensing at all. Many also were the ingenious contrivances to produce a rotatory motion by the continuous action of the steam, without the intervention of a reciprocating movement: one engine had a revolving axis, another a revolving cylinder; and even Watt himself attempted to substitute the cumbrous apparatus of the sun-and-planet-wheel for the simple arm of the crank. All these are now

matter of history. They excited interest in their day ; had their supporters and their opponents ; and are now gone with their inventors, “*Quo pius Aeneas, quo Tullus, dives et Ancus.*”

The first improvement deserving notice was the adopting Trevithick’s boiler ; consisting of a long cylinder, through the whole length of which runs a tube having the fire within it. Trevithick’s principal object seems to have been the introduction of the engine worked by the mere pressure of the steam, without condensation. It was therefore necessary that the steam should be raised to a much higher degree of elastic force than had hitherto been used ; and for this purpose his boilers are well contrived. They have now superseded the use of all others in Cornwall.

The advantage to be derived from the expansive properties of steam had been apparent from the first ; and Hornblower had, at an early period, endeavoured to turn it to account, by using two cylinders, and causing the steam, after having performed the stroke in the first, to act on the piston of another of double the capacity. But as the steam he used was raised but little above the pressure of the atmosphere, it was found, that the power gained did not compensate for the inconvenience of a more complicated and more expensive machine. The same form of construction was long afterwards revived by Woolf, with steam of much greater power, and with considerable success ; as may be seen in the foregoing pages. His second cylinder was four times the size of the first. To him we owe the establishment, if not the introduction, of the use of high pressure steam with expansion and condensation.

The advantage which these engines possessed over those of a low pressure was soon made known by the monthly reports. The greater expense of their erection and the want of simplicity in their construction, were objections to their general use. Besides being an experienced engineer, Woolf was a skilful workman ; and the engines erected under his superintendence excelled in correctness of construction. After his example or by his instructions, other workmen also attained perfection in the art ; and the engines made in Cornwall were found to yield in excellence to those of no manufactory however eminent.

It now appeared that engines well constructed might dispense with the second cylinder : the mere impetus of the mass of matter in motion being sufficient to carry the piston through two-thirds, three-fourths, or even a greater portion of the stroke, after the steam had ceased to be admitted from the boiler.

Little more remained to be done except carefully to prevent the needless condensation and consequent waste of steam ; and in this Capt. Samuel Grose took the lead (as has been mentioned above) by carefully covering every exposed part with a nonconducting substance.

Thus the engine was reduced to its simplest form,— a single engine on Boulton and Watt's construction. And although our engines exceed in duty three or four fold what Boulton and Watt had ever attained, or, perhaps, thought possible of attainment, yet they are, after all, in name and in reality, Boulton and Watt's engines.

